

FOOD DIGEST

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FOOD DIGEST

VOLUME 1

Jan - March 1991



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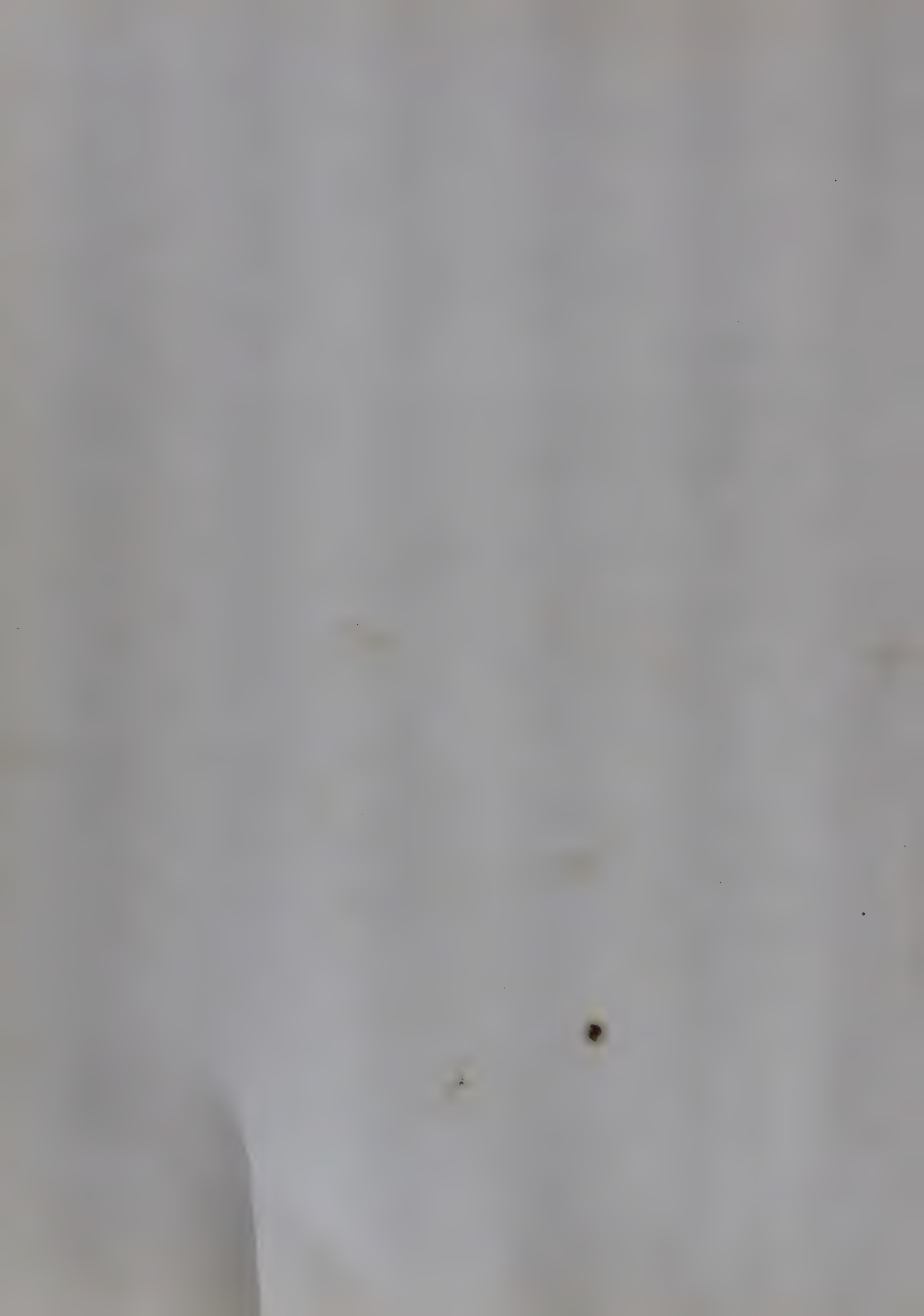
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Raw Materials

1 Broiler rabbit meat

Indian meat consumer would soon be able to buy broiler rabbit meat in the market. This will break the monopoly of mutton and chicken meat and offer a cheap alternative for non-vegetarian processed foods, as well as home cooking.

The ICAR has succeeded in selecting broiler type of rabbits that achieve 2 kg body weight in just 12 weeks. The parenteral stock used in this selection research are the Soviet Chinchilla grey giant rabbit and white giant rabbit from New Zealand. These exotic breeds were procured by the ICAR to evolve a meat rabbit variety suitable to Indian taste and conditions. Rabbit is a prolific multiplier, which can be bred on agricultural waste and has the potential to provide high-quality animal protein equivalent to mutton and chicken at a low cost.

(Chemical Weekly 36(12), 1990, 106)

Storage and Infestation Control

2 All-purpose food storage bag

Food in the zippered Microfreeze Bag can be frozen, refrigerated, boiled, and microwaved, according to its manufacturer. Consisting of three co-extruded layers of tough temperature resistant polyethylene and nylon, it is said to offer excellent barrier properties. Featuring a patented shape, this multipurpose bag can stand up for easy stacking and filling.

For more details write to: Vinmar Impex, Inc 15600 Drummet Blvd, Ste 570, Houston, Texas 77032, U.S.A.
(Chemical Products Finder 9(5), 1990, 129)

2

3

Neem - the natural pesticide

A company called Conster Chemicals near Madras has perfected a pesticide called Sukrina based on the properties of neem oil. Being non-toxic, the oil leaves behind no harmful residues and has therefore no side or toxic effects on animals or human beings. With environmental laws on the increase, Sukrina has found acceptance in western countries as a user friendly pesticide.
(Business India 29 October - 11 November 1990, 14)

Food Additives

4

Aspartame using papain

Victorian company Sirius Biotechnology Ltd. has developed a commercial process based on a CSIRO patent for the production of the artificial sweetener aspartame. It is made by combining two amino acids, phenylalanine and aspartic acid. The method uses an enzyme catalyst, papain, to combine the same two amino acids in a less complicated, more economic and more environmentally friendly process. Papain can be extracted in commercially sufficient quantities from the skins of green pawpaws.

For more information contact: Dr. Peter Tonkes, Technical Director, Sirius Biotechnology Ltd., 31, Pinnacle Road, Altona North Vic 3025.

(Documentation Bulletin No.80, 1990, 17)

5

An alternative to monosodium glutamate (MSG)

Fries and Fries Inc (USA) has recently developed and marketed a natural alternative to MSG for processed foods. The replacer can be added to processed meats such as sausages, sauces for meats and vegetables, seasonings, condiments, gravies, marmalades, soups and Chinese foods. It is offered as a dry powder. It is stable in microwave ovens, freezing hot fills and retort.
(Chemical Weekly 36(12), 1990, 108)

6

Purity gum replaces BVO

Since the time use of BVO has been banned by the Ministry of Health, Govt of India, the soft drinks industry has been searching for an alternative. A British company has developed a unique, emul-

sion-stabilising food starch product Purity Gum 1773, which replaces gum arabic (BVO), in flavour and cloud emulsions for carbonated and non-carbonated beverages. Purity Gum 1773 is available in white to off white powder form with about 11% moisture, pH 6 and falls under EEC class A. It is cold water dispersible and has viscosity similar to gum arabic. Designed specifically for use in flavour and cloud emulsions that may undergo extreme long-term storage or cold storage where thickening of many other starch emulsions may occur, it is excellent when used in emulsions that contain non-essential oil flavours, eg compounded fruit flavours, etc. The advantages of Purity Gum 1773 over gum arabic are many. It reduces stabiliser use up to 50% of gum arabic level. Starch level rarely exceeds 10-11% of the emulsion. An average oil particle size of 1.0 micron or less can be obtained (desirable for systems) which do not contain ingredients to increase specific gravity of the oil blend. Also there is no need for beating or long term dispersing procedures.

For more details write to: Asma Agencies 7 Raikar Bhavan, 2nd floor, Sector 17, Vashi, New Bombay 400 705.
(Chemical Products Finder 9(5), 1990, 81)

Processes

7 Cashew-fruit drying

The cashew fruit consists of a fleshy cashew apple and the cashew nut, which is inside a shell containing caustic phenols. Traditionally, the cashew apple was not used because of its unpleasant astringent taste. The shells were broken open using a mallet and the nuts removed by hand. Not only did this result in a large number of broken nuts, but the farmers' hands were burnt by the caustic phenols.

Now the nuts are heated until they burst open and the phenols ignite, so that provided the farmers keep wood ash on their hands, they have little chance of being burnt during shelling.

The technology which is used for processing the cashew apples was developed by Dr. Rodney Cook, originally for the production of caramelized fruit. An additional first step was necessary to remove the bitter taste from the cashew apples. This involved boiling the apples in salty water for fifteen minutes, then perforating and compressing them in specially cured wooden devices. The compressed apples are then boiled in sugar for two hours. Some 350 kg of sugar are used with every 1,000 apples with enough water to cover the apples. The sugar is re-used twice.

The boiled apples are then dried. The Brace Solar Dryer is considered most suitable. The apples are put in 1.2m x 0.6m wire trays to a depth of 2.5cm, inside a 1.5m x 1.2m wooden cabinet which is covered with plastic film. Underneath the wire trays there is a black collector plate. The cabinet is inclined at 80° 59', set towards the east in the morning and moved during the day. The apples are dried in one day and have a shelf-life of six to eight months.

The scheme has been extremely successful. By 1985, over 5,000 kg of cashew produce had been marketed and orders for 1987 are greater than 35,000 kg. This provides employment for 2000 families at £ 5.00 a day rather than £ 1.50 a day.
(Appropriate Technology 17(2), 1990, 23)

8

Process to refine crude rice bran oil

Bharat Edible Oils and Fats Ltd., (Bombay) has developed an indigenous process to refine crude rice bran oil into edible grade. The new process based on molecular distillation technique can refine crude bran containing free fatty acids (FFA) up to 69%. This process has undergone pilot tests in West Germany. The process claims several advantages. It eliminates the use of toxic hexane and alcohol and has the flexibility to refine any kind of high FFA oils into edible grade. Further, it is pollution free, reduces consumption of caustic soda by more than 80%, saves energy (up to 70%) with low capital costs. It recovers Vit E and yields high quality oil.
(Chemical Weekly 36(12), 1990, 108)

9

Enzyme-based cereal food for babies

The researchers at the Faculty of Home Science, the Maharaja Sayajirao University, Baroda have developed an enzyme based thinning agent for cereal foods for babies of 6 months to 36 months. The thinning agent based on the enzyme amylase is used to produce the so called amylase-rich food (ARF). The ARF would help to increase the intake of cereal food by children in the age of group of 6 months to 36 months and improve their health.

The ARF has already been approved by the WHO and has been found useful in improving the growth of undernourished children.
(Chemical Weekly 36(12), 1990, 106)

10

Cheese from peanuts

Food researchers at the Univ. of Wisconsin (USA) are confident of producing cheese from peanuts for better nutrition in the near future. According to researcher B.L. Santos (Univ. of Wisconsin), the protein content of the peanut based imitation cheese spread was almost twice that of commercial cheese products. This imitation cheese will be an ideal protein food for underdeveloped countries as well as for protein starved vegetarian country like India. This peanut based imitation cheese will have longer shelf-life than milk-

based cheeses without refrigeration. The researchers are confident of developing a palatable product as a substitute to the dairy cheese.

(Chemical Weekly 36(12), 1990, 106)

11 Low palmitic soybean

A new soybean low in saturated fat has been developed by biotech research at the Univ. of Iowa State. The new variety will be field tested in the current year. Oil from this new line of soybeans contains about 6.2% saturated fat, about half the saturated fat content of oil from current commercial system varieties.

The new lines produce an oil that has as little as 3.5% palmitic acid, sharply lower than 10% palmitic acid in standard soybean oil and slightly lower than 3.9% palmitic acid found on canola oil. At the same time, the oil retains its 2.5% of stearic acid. The development of such a soybean variety would help to compete with canola oil, which is lower in saturated fats than regular soybean oil.
(Chemical Weekly 36(10), 1990, 92)

12 A new process removes cholesterol from fats

The Omega Source Corporation of Burnville, Minnesota, USA is commercializing a process for removing cholesterol from animal fats or oils. It plans to have an intermediate scale plant in operation in mid-1990.

The oil or fat is deaerated under a vacuum and mixed with steam.

The mixture is then fed into a flash chamber where it is flash vaporized, and the oil is then cascaded down an alternating series of jackets and disks heated against a steam counter current to vaporize the cholesterol rich fractions.

The process takes less than 5 mins, removes 90-94% of cholesterol from the fat or oil and results in yields greater than 95% the firm reports.

The company estimates that the process will add at most 10 cents a pound in operating costs.

In many cases it will cost less, depending on the type of oil fat being processed and the scale of operation. For most products there will be no impact on the flavour.

Omega source has been operating a pilot plant since November 1988 and is in the process of constructing an intermediate sized plant. They will turn out 300 lbs of treated product per hour.

The company is licensing the technology to food companies.

It expects to see industrial scale usage by the end of 1990. Most food processors would find the equipment fairly easy to imple-

ment into their systems. Both dairy and fish oil industries have shown interest in the new technology.

It is reported that the company is working closely with processors to develop no cholesterol fish oil mayonnaise, peanut butter, canned fish, surimi prototype and salad dressing.
(Chemical Weekly 36(3), 1990, 92)

13 Advanced fruit juice extraction technology

The Bellmer Fruit Juice Press, a German innovation, provides users with greater profits through increased cost-efficiency. The Bellmer Fruit Juice Press's greatest advantage is its ability to give high yields while maintaining continuous and reliable operation.

Besides apple, the Bellmer Press is also capable of handling sticky, over-ripe fruits, stone fruits and berries which are usually difficult to press. Grape growers should also look at the Bellmer Press's versatile capabilities.

The design of the Bellmer Fruit Juice Press has evolved from the Bellmer Winkel press which has already earned a reputation in other industries where it has been used for municipal and industrial sludge dewatering as well as for pulp, paper and board production.

The Bellmer Fruit Juice Press requires a feed mash height of 3 - 5 cm for continuous juice processing. The mash is sandwiched between two belts and under gentle pressure the first juice extraction takes place. Then, as the mash moves through the machine, perforated rollers continue the pressing with bilateral discharge of juice. Finally smaller high pressure rollers extract the remaining juice to give maximum yields.

Variations in production throughputs are handled by changing the belt speed through either a mechanical speed variator or an electrical frequency variator. The drive unit is fully enclosed, oil bath lubricated, and directly attached to the press drive rolls.

The Bellmer Fruit Juice Press is available in five different sizes with capacities 4, 8, 12, 17 and 25 tons apples per hour. Yields average 75% by weight by freshly picked apples. Best results are achieved with the Bellmer Apple Crusher in combination with the Bellmer Fruit Juice Press, giving yields upto 80% by weight.

For details, contact: Dorr-Oliver Pty Ltd., 28 Spring St., Chatswood NSW, Australia.
(Tech Monitor September-October 1990, 21)

14 Artificial meat

A meat from animal/plant-protein technology has been developed at the Moscow-based Institute of Organoelemental Compounds, Academy of Sciences of the USSR. Usually, protein filaments are twisted as yarn to produce meat-like fibre. It is a costly practice. Now a

bundle of 10,000 and more filaments can be produced which makes the process fast and inexpensive.

The new method has found its way into the Soviet food industry. Tasty and nutrient artificial meat is added to sausages, minced meat and fast foods.

(Tech Monitor September-October 1990, 8)

5 Red dye from carrots

Two agricultural researchers from Israel, Mr. Ron Vunsh and Michael B. Matilsky practising tissue culture have developed a technique of producing a red dye for food beverages and cosmetics from carrots through tissue culture.

In such cell cultures, plant cells are bred without growing the entire plant. The new colourant, anthocyanin has several advantages over the existing food grade dyes. The deep red colour is stable under a wide variety of conditions and has no cancer causing risks.

The dye is produced by isolating anthocyanin from the carrot cells and then freeze-dried into a powder. By adjusting the acidity levels of the cell culture, the product can be varied from dark red to purple to blue.

(P.T.I. Science Service 9(21), 1990, 12)

Byproducts and Waste Utilization

6 Agro-waste fuelled root crop dryer

The Phillipine Root Crops Research and Training Centre of the Visayas State College of Agriculture in the Philippines developed a root crop dryer which utilizes agro-waste as fuel, reports Asia-Pacific Tech Monitor.

The dryer basically consists of the furnace chamber which also serves as the primary heat exchanger, the drying chamber and the secondary heat exchanger. The product being dried does not come in contact with the smoke or products of fuel combustion.

Heat needed for drying is supplied by the combustion of fuel in the burning chamber below the trays in the drying chamber. A clearance of 25 cm between the upper surface of the heat exchanger and the bottom trays is provided to avoid damage to the product being dried. During the drying process, ambient air is heated to an average tem-

perature of 60 degree celsius on contact with the outer surface of the drum (primary heat exchanger) and moves up by natural convection. The secondary heat exchanger, consisting of rectangular ducts connected to the primary heat exchanger, is mounted above the drying chamber, it heats up the moisture-laden air from the drying chamber to prevent condensation and to facilitate its exit through the chimney.

One batch of 100 kg fresh root crops chips can be dried on trays within 7-8 hours requiring 50-60 kg of coconut husk for fuel. For uniform drying, the trays are alternatively rotated.

The dryer can be used for drying cassava and sweet potato chips as well as other agricultural and marine products with optimum drying results.

(P.T.I. Science Service 9(19), 1990, 16-17)

17 Waste-fuelled furnace for crop drying

A furnace that uses agricultural wastes as fuel and has potential applications for mechanical drying of crops has been developed by scientists at the Tamil Nadu Agricultural University.

It consists of a burning chamber, a flue chamber, two circular casings, a chimney and a centrifugal blower powered by a motor. The assembly is mounted on a frame with wheels for easy transportation.

The furnace has been tested with sugarcane bagasse as fuel with the average feed requirement of about 18 kg per hour. In tests, paddy and coconut were dried in the mechanical drier of capacity of one tonne coupled with the waste-fuelled furnace.

Moisture content in the paddy was reduced from an initial 22 per cent to 13 percent in 10 hours at a hot air temperature of 63 degree celsius and a 33-cubic-metre-per-minute (cmpm) air flow rate. The scientists expect the new furnace to cost about Rs. 15,000. (P.T.I. Science Service 9(21), 1990, 2)

Processed Products

18 A new natural fruit juice - yoghurt combination for infants marketed in USA

Gerber Products Company of USA, a leading producer of infant foods has recently introduced 'Fruit Juices with Low Fat Yoghurt Com-

ination' which combines yoghurt and natural fruit juices in ready to serve bottles.

This is new landmark in infant nutrition. This new line is available in four varieties - Apple, Mixed Fruit, Banana Juice Medley and Pear Peach. Each 4.00 ml of bottle contains 120% of US Recommended Daily Allowance of Vit C with 90-100 calories per serving. The 45% low-fat yoghurt provides calcium and protein, and the juice contain 100 artificial flavors, colours or preservatives. It has stable shelf life and refrigeration is not needed until the bottle is opened.

(Chemical Weekly 36(8), 1990, 95)

Equipment and Machinery

9 Adaptable packaging unit

Specifically designed for small to medium sized packaging operations in food processing, the Klockner-Hooper 4000 Thermoformer features efficient, simple electronics. Its modular construction is designed for quick, easy changeovers to different package types and sizes. This compact form/fill/seal machine can be customised for manual or automatic filling.

For more details write to: Klockner-Pentaplast of America, Inc
Klockner Rd, P.O. Box 500, Gordonsville, Virginia 22942, U.S.A.
(Chemical Products Finder, 9(4), 1990, 140)

20 Automatic rotary sealer

This RS16 automatic rotary sealer is for sealing plastic insert/plugs of LDPE, HDPE, PP, etc on to bottles of the same material. Bottles are handled through a timing screw and starwheels for smooth movement at high speeds. Temperature of sealing heads are controlled for effective sealing. The machine can handle bottles of different sizes and shapes. It is an ideal machine for leakproof/pilferproof packing of edible oils, petroleum products, adhesives and a variety of products in cosmetic, food, pharmaceutical or pesticide industries. Output is up to 120 bottles/minute.

For more details write to: Autopack Machines Pvt Ltd, 101-C, Poonem Chambers, 1st floor, Dr. Annie Besant Road, Worli, Bombay-400 018.

(Chemical Products Finder 9(Annual), 1990, 68)

21 Powder dosing machine

Autopack manufactures a semi-automatic powder dosing machine, the Model PD 30, for accurate filling of powder and granules in containers, bottles, pouches, etc, with an accuracy up to $\pm 1\%$. Filling capacity ranges from 5 g to 1 kg. Output is up to 30 fills/min. The machine has an electronic counter for accurate fill and easy adjustment of weight. A special stirring system ensures good de-aeration. Power input is 0.75 kW. Fully automatic models with inline coding, cap fixing, etc are also available. The machine is most suitable for filling tooth powder, talcum powder, baby powder, dry syrups, coffee and food, pharmaceutical, chemical, or cosmetic, etc in powder form.

For more details write to: Autopack Machines Pvt Ltd., 101-C Poonam Chambers, 1st floor, Dr Annie Besant Road, Worli, Bombay-400 018.
(Chemical Products Finder 9(Annual), 1990, 145)

22 Carton filling machine for frozen concentrated juice

Shikoku Kakoki Co., Ltd of Japan has put on the market a frozen concentrated juice carton-filling machine named "Tab Top U-M 120/150". A unit has already been delivered to a leading American concentrated juice packer, and the manufacturer is now introducing the machine to the domestic market.

This filling machine uses a brick-shaped concentrated juice paper container developed by Pure-pack Inc of the United States. Compared with conventional cylindrical type containers, this new container slashes distribution costs by roughly 25% and also eases transportation substantially.

The machine fills concentrated juice cooled to about -4°C in sherbet from directly into the containers, then quick-cools these containers to -30°C for storage. Filling capacity is 12,000 cartons/hr, and the machine is capable of handling four kinds of cartons having inner capacities of 6, 8, 12 and 16 ounces.

For details, contact: Shikoku Kakoki Co. Ltd., 12, Jingumae, 6-Chome, Shibuya-ku, Tokyo, Japan.
(Tech Monitor September-October 1990, 22)

23 Flash driers

SAS Flash Driers are suitable for all types of temperature sensitive materials in any chemical, food and pharmaceutical set-up. The material to be dried is dispersed through a rotary disperser. Hot air comes in contact with the wet feed and rapid heat transfer takes place. Semi-dried products travel suspended in a pneumatic drying tube and in the process, the material get thoroughly dried. In fact, it is possible to achieve bone dryness in a flash drier. Products with high moisture content can be dried by using pre-driers or back-mixing. Since the drying time in this type of drier is only

2 to 4 seconds, all types of temperature sensitive products can be dried successfully. For product recovery, SAS has high efficiency cyclone separators, scrubbers, and bag filters for specific requirements. Multi-stage flash driers are also available.

For further information write to: Swirl Air Systems Pvt Ltd., 210 Nahar and Seth Ind Estate, Cardinal Gracias Road, Chakala, Andheri (East), Bombay 400 099.
(Industrial Products Finder 19(1), 1990, 19)

4 Fluid bed dryer

Blanden Cole offers batch type fluid bed dryers to Arthur White/modified designs as well as continuous fluid bed dryers for chemical, pharmaceutical, food and other industries. The dryer features shorter drying cycle time, is suitable for heat sensitive materials, and makes possible quality dried products, and energy savings. The bed dryer is available in several standard sizes with volumetric capacities of 5, 10, 20 ft³ as also 50, 100, 200, 300 and 400 litres, with options of steam or electrical heating and MS/SS 304/316 contact parts. The sleek and streamlined dryer also features blower location on air entry side of the bed (providing faster drying and safer working with explosive materials), positive product container sealing, and higher fluidisation volume and easier cleaning of the filter bag housing. The continuous fluid bed dryers are custom-designed.

For more details write to: Blanden Cole, Division of Amritlal Chemaux Limited Rang Udyan, Sitladevi Temple Road, P.O. Box 6498 Mahim, Bombay 400 016.
(Chemical Products Finder 9(Annual), 1990, 364)

25 Rotary continuous drying/cooling equipment

Age Technologies manufactures continuous heat transfer equipment for drying/cooling of various materials to be processed. They are intended to bring the material into direct contact with the heat transfer medium, either co-current or counter-current. The medium can be warm/cool air or fuel-gases, the mode of heat transfer being mainly by convection. These equipment are available in MS/SS construction and are custom designed for specific applications. The materials to be processed can be chemicals, minerals, fertilizers, food products, etc, in powder, granule, crystalline or fibrous form.

For more details write to: Age Technologies Pvt Ltd, 25A/26, Gandhi Oil Mills Compound, Gorwa Industrial Area, Vadodara, Gujarat 390 016.
(Chemical Products Finder 9(4), 1990, 111)

26 Quick freezing for food processing plants

Described as easy to operate, the RECO Vertical Plate Freezer Model VPF allows rapid loading, freezing, and unloading of fish,

offal, vegetables, fruits, and ground meat. The equipment is generally used for products to be further processed later. The vertical aluminium plate freezing process is said to provide excellent heat transfer and low cost quick freezing of blocks of product for containerisation and palletization. Unlike material frozen in cartons, the uniformly thick and flat blocks can be stacked securely.

For more details write to: Refrigeration Engineering Corporation, 5680 E Houston St. San Antonio, Texas 78220, U.S.A.
(Chemical Products Finder 9(4), 1990, 108)

27 Semi-automatic liquid packing machine

Unipac's pneumatically operated filling and sealing machine is suitable for packing liquids like milk, fruit juices, ghee, oil, vanaspathi and chemicals in plastic pouches. It can fill from 100 to 1,000 ml at a speed of 300 to 600 pouches per hour. The volume can be varied infinitely with an accuracy of $\pm 2\%$. The machine has two stations, one for filling and the other for sealing. It can be operated automatically or manually. The readymade pouches have to be fed to the filling station manually. By operating a feather-touch button a predetermined volume of liquid is dispensed into the pouches. For free flowing liquids, a 40-litre SS balance tank is provided in the machine. In the case of viscous liquids, a pneumatically operated pump is provided to suck and pump the liquids. After the filling is over, it has to be transferred to the sealing station where any heat sealable pouches can be sealed. The machine has electronic solid state control system. All contact parts are of stainless steel.

For more details write to: Universal Packaging Co., No 74, Mugappair Road, Padi, Madras 600 050.
(Chemical Products Finder 9(Annual), 1990, 200)

28 Bakery plant and machinery

Machinenfabriek Holtkamp of Holland, engaged in the manufacture of bakery machinery since 1951, offers a complete range of fully and semi-automatic plant and machinery of various capacities for the bakery industry. The range includes automatic spiral kneader/tipper combination, single pocket dough divider, conical dough rounder, intermediate overhead proofer, final moulder, final proofer and rotating rack ovens. Optionals include water cooler, dough-hopper above divider hopper, bundiver/rounder, slicing machines, and pan-greasing machines. Slicer include automatic and semi-automatic load slicers, and blowpacking machines. Automatic donut manufacturing machine is also available.

For more details write to: Alpha Electric and Engg Co Pvt Ltd., 89 Bhawani Shankar Road, Dadar (W Rly), Bombay 400 028.
(Chemical Products Finder 9(Annual), 1990, 196)

9 Biscuit stacking machine

Russo Electronic Industries manufactures biscuit stacking machine. It uses a precision control circuit that helps in cutting and stacking of biscuits in the required size and shape. Model Soni-I performs stacking of biscuits only. Model Soni-II performs stacking and cooling. The machine can be used in single as well as three phase.

For more details write to Russo Electronic Industries, Subhash Nagar, Kalyan-Ambarnath Road, Ulhasnagar, Dist. Thane, Maharashtra 421 003.

(Chemical Products Finder 9(Annual), 1990, 355)

30 New solar heater developed to process tea

Prof. C. Palaniappan, General Secretary of the Planters' Energy Network, has developed a solar air heater for processing tea.

The system, costing Rs. 2.8 lakhs would save fuel worth Rs. 70,000 per year.

Instead of the conventional prefabricated solar hot air or hot water panel the roof itself would be converted into a solar hot air system. The solar air heater will supplement the energy requirement for tea drying.

The heater has been developed with the assistance from the Tamilnadu Energy Development Agency, Department of Non-conventional Energy Sources.

(Deccan Herald 23 October 1990, 14)

31 Thresher for sunflower seeds

Agricultural engineers at the Mahatma Phule Agricultural University, Rahuri, Maharashtra have fabricated a pedal - operated, light-weight low-cost thresher for sunflower seeds.

It is reported to have 100 per cent efficiency and 96 to 98 per cent cleaning results, with an output of about 45 kg per hour at a cost of Rs. 30 per quintal.

The manually operated thresher consists of three main parts: (i) threshing unit made of spoked wheel, top cover with four holes and seed mixture collector (ii) a cleaning unit with a blower fan, and (iii) power transmission unit.

The threshing wheel is like a spoked cycle wheel. Dry sunflower heads are held on this wheel when it is revolving while the seeds collect in the seed collector.

If the flowers are fairly dry (more than 12 per cent water content) the threshed material mainly consists of seeds. If they are drier, some debris from the flower head also comes out which is blown away by the blower.

Power to the threshing wheel is supplied through a chain and socket wheel drive as in a bicycle.

Four persons are required to operate the machine. Three of them hold the flower heads on the threshing wheels through holes, one after the other, while the fourth operates the pedals while holding the flowers. The operators can take turns to operate the pedals. The machine can run on a one horse power motor when all four men can hold the flowers on the threshing wheel.

The machine is suitable for medium, small and marginal scale farmers. The losses are minimum without any damage to the seeds.

The seedless flower heads can be further dried for use as fuel, cattle feed or in hard board industry.

(P.T.I. Science Service 9(20), 1990, 4-5)

32 Palm oil extraction plant developed

India has achieved a major break through in its effort to provide cheap oil processing facilities to oilpalm growers for attaining self-sufficiency in edible oils.

The break through was evidenced in the launching of the first indigenously designed and fabricated palmoil extraction mini-plant at the Central Plantation Crops Research Institute's research centre at Trivandrum last week.

Designed and developed by the Council for Scientific and Industrial Research (CSIR's) regional research laboratory under the Indian Council for Agricultural Research (ICAR) funding programme, the mini plant has many unique features.

It is ideally suited to the needs of the small and medium scale farmers and would reduce transport costs. The mill will also use the fuel available on the farm. The oil extracted would have an attractive reddish yellow colour with all the natural attributes, besides containing a high degree of Vitamin A, according to sources in the agricultural ministry.

Andaman and Nicobar islands, some areas of Karnataka, Andhra Pradesh, Maharashtra and Kerala are among the identified states where oilpalm cultivation is being taken up. The aim is to save some of the amount of about Rs.1000 crores being spent annually on edible oil import.

The oilpalm has the potential of producing two to six tonnes of edible oil per hectare and is the highest oil-yielding crop as compared to other oilseeds grown in the country like groundnut, mustard, sunflower, coconut, etc.

(SEA News Circular 3(1), 1989, 35-36)

33 An inexpensive oil-seed conditioner

Mechanical crushing has long been used for obtaining edible oil from oil-seeds. Early techniques employed wedge presses or machines based on the principle of the ghani or simple plate presses. Industrialization has seen the development of hydraulic plate presses which operate on a batch basis, but these have largely been superseded by the continuous screw expeller. Small-scale techniques in developing countries normally use plate presses (with a screw or hydraulic operation) or continuous screw presses, and these have a seed throughput of about 30-60 kg/hr.

Whichever method is employed, extraction will usually be made more efficient if the seed is pre-heated (conditioned) before pressing. The conditioning of oil-seeds coalesces the oil droplets, lowers the oil viscosity and allows the moisture content of seeds to be adjusted to an optimum level for oil expulsion for the type of press utilized. Conditioners suitable for small-scale expellers are available commercially but these tend to be both expensive and bulky for shipment. In an attempt to overcome these problems, a conditioner based on an electrically driven DIY ('Do-it-Yourself') cement mixer has been developed.

Small cement-mixer is used for conditioning. In this type of machine the bowl is electrically driven through a gear mounted on its circumference. Using this design the bowl can be tilted independently of the motor drive which is mounted on the side of the frame. It was this type that was selected for adaptation, as heat application at the base of the bowl was judged unlikely to affect the motor drive.

Modifications were made to the machine as follows:

- The two large mixer blades inside the bowl were replaced by strips of 35 mm aluminium angle each 200 mm long.

- The angle of tilt in the mixing position was adjusted so that the heat was evenly directed over the base of the bowl.

- In the initial heating trials, grease was lost from the main bearing, but this problem was overcome by the provision of a grease nipple, and by substituting the original packing with grease of a high melting-point.

- A metal cowl, tilting with the bowl, was added to reduce heat losses.

- The lateral support bar immediately beneath the bowl was modified according to the type of the heat source used.

Secondary trials were undertaken with a small propane burner (No.1) of approximately 3kW output fixed to the existing support bar beneath the bowl. The provision of an 8.7kW propane burner (No.2) required the construction of a new support bar incorporating the combustion of firewood, charcoal burner. For trials utilizing the combustion of firewood, charcoal and coconut shell, the support bar was modified so as not to obstruct the heat source. The same modified support bar was employed in trials in which two domestic electric fires (2 x 1.5kW) provided the heat source. The fires, each of which was fitted with radiant reflectors, were mounted with their protective guards about 2 to 3 cm from the mixer bowl. The use of electricity requires special attention to the safety aspects of the heating unit. The mixer bowl should be rotating when heat from any source is applied and the heat source should be turned off or removed before emptying the bowl.

Trials were carried out on 10 kg quantities of sunflower, sesame, decorticated groundnuts and copra.

It was found in trials that all heat sources other than the two electric fires can provide an adequate supply of conditioned sunflower, ground copra and sesame seeds to match the through-put of the expeller.

Thorough mixing and heating is an important requirement of a good seed-conditioner design, and this is readily satisfied by the tumbling action of the mixer. The final oil yield from low-oil-content sunflower seed using the Mini 40 expeller was increased from 17.4 to 19.6 litres per 100 kg seed by heat conditioning. The increase was achieved with a 25 per cent reduction in the power requirement of the expeller, which suggests that heat conditioning may reduce the wear on the expeller. Expeller wear is a major consideration in the financial viability of the process.

The type of mixer used in these trials is readily available in the UK and costs less than £ 150. It is also available in some developing countries.

The conditioner is in regular use in pilot studies and there have been no indications of mechanical problems in either the motor or the drive mechanism.

(Appropriate Technology 17(2), 1990, 28-30)

34 Rice hulling roller made from polysar elastomer

Although the basic steps of harvesting and preparing rice for cooking and eating have not changed, modern methods are being introduced. The process is becoming more automated and more demanding of the rubber components used in the hulling equipment.

Colin Moakes, technical manager for industrial rubber products at the Polysar Rubber Division's technical center in Singapore, recently prepared a paper entitled "A longer lasting rice hulling roller made from KRYNAC nitrile rubber".

Early resilient roller covers were made from clay-filled natural rubber. The filler provided sufficient hardness to break the hulls; but the rubber quickly wore down and the rollers had to be recovered frequently. Most rollers in use today are metal cores covered with synthetic rubber, most commonly silica-filled high-styrene SBR. This type of compound is said to have a lifespan of hulling 30 tonnes of rice before needing to be recovered. Mr. Moakes explains how roller compounds based on the Polysar Rubber Division's KRYNAC nitrile rubber can have higher wear resistance than SBR.

He notes a growing trend toward automated rice processing operations which have higher machine speeds that place even greater demands on roller coverings. High running speed increases heat build-up in the roll cover. As the temperature rises, the cover's hardness decreases, which "imposes a practical limit on the speed of the mill because the rolls will no longer break the husks if the operational hardness of the covers goes below approximately 83 (Shore A)", says Mr. Moakes.

Being less thermoplastic than high-styrene SBR, nitrile rubber softens less in heat and therefore does not have to be compounded as hard. Blends of KRYNAC nitrile rubber with TAKTENE 1220 polybutadiene rubber, another Polysar Rubber Division elastomer, have produced rollers with lower dynamic heat build-up, permitting higher operational speeds before the maximum temperature of 80 C to 100 C (180 F to 212 F) is reached. Mr. Moakes says that laboratory measurements indicate the nitrile/polybutadiene blend would also have a longer lifetime.

"The latest technology", he concludes "offers a rice roll cover with twice the useful lifetime of a commonly used SBR compound with the added advantage that machine running speeds can be increased to improve efficiency without affecting the quality of the rice grains". (Chemical Weekly 36(10), 1990, 104)

35 'Singhara' decortication

A new machine developed by Shri D.K. Jain (Scientist PHT Scheme, College of Agricultural Engineering, JNKVV, Jabalpur 482004) promises to eliminate the drudgery involved in the manual decortication of singharas.

The water chestnut (Trapa bispinosa Roxburgh) locally known as singhara is an aquatic fruit crop grown in the ponds during August to November in many States of India. In green form its kernels are consumed directly or by boiling after decortication. It is estimated that 80% of this crop is sun-dried and later on decorticated manually to produce 'singhara goti' which is milled to make flour.

In singhara cottage industry the present method of manual decortication is a labour intensive practice. This manually operated machine is simple and cheap and could be easily operated.

The machine consists of a fixed, perforated, semi-circular concave and a reciprocating comb operated manually by a lever. Dried

singhara when fed gets decorticated simply by operating the lever. The husk and decorticated kernels (goti) are discharged through the perforations of the concave. This machine is operated by a single person at a decortication speed of 30 kg/hr with an efficiency of 98%. The current estimated cost of the machine is Rs. 1000, which can be reduced when mass produced.
(Invention Intelligence November 1990, 488)

36 Automatic garlic skin removing machine

IWASE Tekko Co. Ltd of Japan has started marketing a new automatic 'Garlic Skin Removing Machine' that enables mass removal of garlic skin. The machine automates the work of removing garlic skin individually by hand and enables about 5 kg of garlic to be skinned in about 15 min. The machine is to be marketed to domestic food processors and, at the same time, exported to the countries where there is a great demand for garlic.

The machine is equipped with a square mortar provided with a special type of revolving blade. The garlic is fed into the mortar and revolved for about 15 minutes, then taken out and washed in water, by which the skin and meat are separated naturally.

The central mechanism of this skin removing system is the special blades fitted to the rotary shaft. The rotary shaft is designed with a double construction, with a spiral screw equipped on the rotary shaft's top and four rods (blades) mutually arranged at right angles on the bottom. The four rods press the garlic against grooves etched on the bottom of the mortar while revolving and removing the skin; meanwhile, the spiral screw prevent the garlic from popping out and recirculates the garlic into the mortar's bottom.

A similar machine has already been developed for peeling onions using compressed air to blast off the skin but this machine cannot be used for garlic, whose skin is harder to remove.

The newly developed system is being marketed at a domestic price of ¥ 340,000 and a deluxe model with timer at a price of ¥ 380,000.

For more details, contact: Iwase Tekko Co. Ltd., 6, Higashihama-cho, 2-Chome, Hana City, Aichi Pref, Japan.
(Tech Monitor September-October 1990, 22-23)

37 Teflon-based grease for food industry

A new Teflon based grease has been launched on the Australian market by Innotech Pty Ltd of Perth. The grease has approval in France for direct contact with food, according to the requirements of Codex. The conditions for Codex approval are more severe than those set by the FDA in the USA. Approvals by State Health Departments in Australia are currently being sought, and have already been granted in some States.

Teflon Codex Grease has been developed by Interflon of Holland specifically for the food and pharmaceutical industries and is recommended for chains, slide-ways, gears and bearings of filling packaging lines, mixers and presses where direct contact with food products is inevitable.

The Teflon-based grease is completely non-toxic, transparent, durable and non-tainting, has excellent water-resistance and steam-resistance of up to 150 C and permits sustained high loads of up to 80 kg/cm.

The grease is available in a spray can with an ozone-friendly propellant and in 1 L tubs.

For details, contact: Innotech Pty Ltd., P.O. Box 829, South Perth 6151, WA, Australia.

(Tech Monitor September-October, 1990, 22)

38 New coating for equipment in sugar industries

A new organic coating to protect the steel structures and equipment used in sugar industries has been developed by scientists at Karaikudi. Studies at the Central Electro Chemical Research Institute (CECRI), Karaikudi, in Tamil Nadu, showed that a new epoxy-based coating was much better than chlorinated rubber-based paints in protecting the steel equipment in sugar industries.

In sugar industries, mild steel structures are affected by corrosion due to high temperatures and the high acid content and impurities in the cane juice.

Organic coatings available so far have not been effective in controlling corrosion. Scientists at the CECRI prepared the epoxy and chlorinated rubber based paints using pigments and extenders such as titanium oxide, talc, mica and bentonite. Next, they studied the effects of the two paints on mild steel panels of different sizes. Tests showed that the flexibility, impact resistance and wet abrasion of both paints were good, but the hardness and adhesion of epoxy-based paint were slightly better when compared on chlorinated rubber paint.

Unpainted panels started rusting within one month when kept in a humidity cabinet. Epoxy-based paint is better than chlorinated rubber based paint for coating equipment in sugar industries, the CECRI researchers conclude.
(Chemical Weekly 36(14), 1990, 108)

Packaging

39 Edible bio-packing

The Franz Haas machine line-up now offers machines for the production of bio-packing made from vegetable-based raw materials. The world's largest waffle producer has evolved a versatile packing material as a substitute for paper and plastic. The Haas packing field of use ranges from inserts for chocolate boxes through fruit trays to containers for hamburgers, hitherto mostly of polystyrene. The latest addition is the edible yoghurt container. The container is made of corn or wheat starch, weighs only 5 gm and contains hardly any calories for the benefit of conscientious weight watchers. The container's interior is a water-resistant, neutral flavoured and edible lining which corresponds to most of the European food laws. Apart from being fully bio-degradable, the new eco-friendly packing can be produced with a minimum of energy and pollution by any food-processing firm.

For details contact: Franz Haas, Waffelmaschinen Industrie GMBH, Research and Development, Haasstrasse, A-2100 Leobendorf, Austria.
(Tech Monitor July-August 1990, 27)

40 Biscuit wrapping machine

The MOI Brisk is for wrapping of rectangular or square shaped biscuits into packets of 50 to 100 g at speeds upto 85 packets/minute. The machine does a single or double wrap of wax coated paper for both the inner and outer wraps of the packet. An automatic counting and feeding arrangement is under design to increase the output speeds to upto 120 packets/minute. The biscuits are fed on to a continuously moving infeed conveyor which aligns and pushes them into the wrap drum or box. The inner and outer wax coated paper sheets unroll from the bobbin arrangement and passes through the pinch roller. This is placed at the mouth of the box unit and the biscuits plunge through this into the box where the packet is formed. The box provides a 180° turn and the packet is pushed through the top heaters where the longitudinal belly sealing is done. The firming of the seal is done by the top cooling jackets

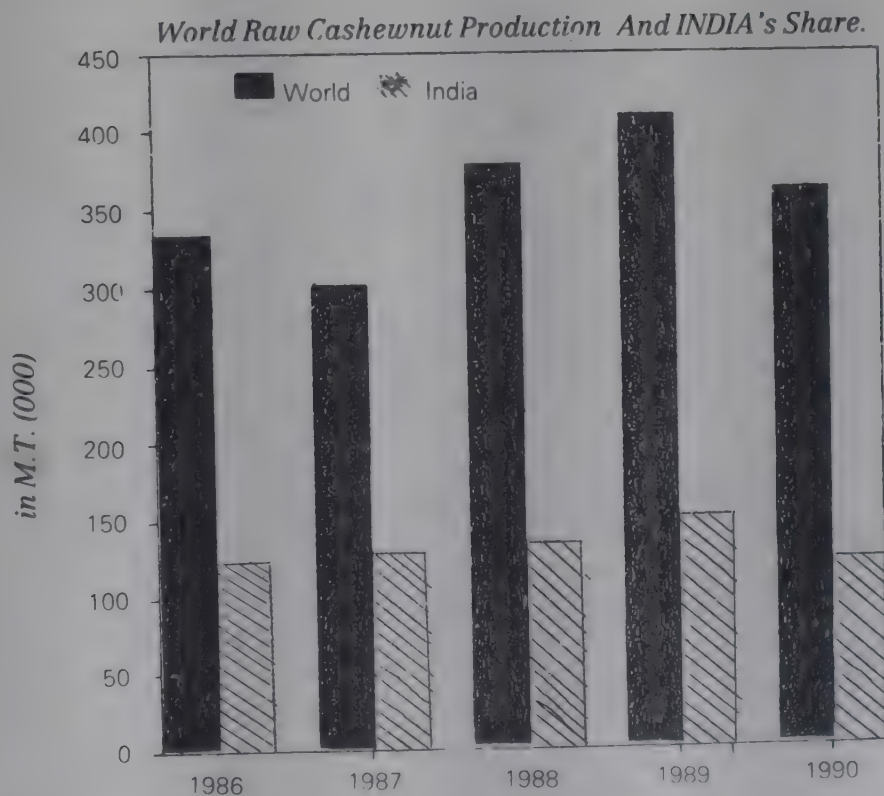
whence the packet passes through the side folder and heaters for completion of the end sealing. The formed packet is now pushed out to the delivery area, tightly sealed and packed. Features: automatic print registration device to control the position of print on the packet; no biscuit-no wrap interlock to prevent paper wastage; digital temperature controllers to minimise variation in heater temperature for even wrapping quality; and output counters and speed counter.

For more details write to: MOI Engineering Limited, A-7, Industrial Estate, Mchall, Chandigarh 180 051.
(Chemical Products Finder 9(5), 1990, 131)

Commercial Intelligence

Production (Raw Materials)

41 World raw cashewnut production and India's share



(Indian Cashew Journal 20(1), 1990, 7)

(Production in '000 tonnes)

State	Rice	Jowar	Bajra	Maize	Ragi	Small Millets	Wheat	Barley
Andhra Pradesh	10128.1	784.7	185.9	541.3	190.5	138.5	9.1	-
Arunachal Pradesh	138.8	-	-	44.6	-	18.7	5.5	-
Assam	2794.8	-	-	12.5	-	5.3	87.5	-
Bihar	6425.8	2.6	4.9	1205.1	80.2	43.9	3220.0	48.0
Goa	156.3	-	-	-	3.8	-	-	-
Gujarat	817.3	433.3	1325.3	480.4	26.9	35.5	1101.7	-
Haryana	1698.0	27.0	432.0	54.0	-	-	5913.0	99.0
Himachal Pradesh	94.5	-	-	669.2	4.4	5.9	600.4	34.9
Jammu and Kashmir	579.6	-	5.4	441.8	-	6.9	245.6	6.1
Karnataka	2377.5	1624.6	282.6	700.7	1399.8	79.5	126.5	-
Kerala	1048.7	1.3	-	-	1.2	2.3	-	-
Madhya Pradesh	4672.6	1783.6	127.0	1430.9	4.8	309.6	3870.1	111.3
Maharashtra	2318.8	6635.1	1204.5	105.3	224.2	118.3	907.1	1.2
Manipur	245.1	-	-	14.9	-	-	-	-
Meghalaya	108.5	-	-	20.1	-	3.1	6.7	-
Mizoram	59.2	-	-	9.1	-	-	-	-
Nagaland	150.0	-	-	20.0	-	-	-	-
Orissa	6284.0	22.8	6.0	195.9	239.2	42.0	65.1	-
Punjab	6697.0	0.5	10.0	399.0	-	-	11681.0	99.0
Rajasthan	151.1	327.6	1828.9	1313.2	-	13.5	3400.1	340.9
Gikkim	20.4	-	-	60.0	7.0	-	20.3	2.1
Tamil Nadu	6231.6	651.7	324.2	59.8	356.0	112.7	0.1	-
Tripura	459.1	-	-	-	-	-	6.6	-
Uttar Pradesh	9356.5	614.6	872.9	1514.1	226.8	168.0	17785.8	717.2
West Bengal	10923.6	0.3	0.2	117.0	12.1	7.2	569.0	8.7
Andaman & Nicobar Islands	30.7	-	-	-	-	-	-	-
Dadra & Nagar Haveli	18.0	0.5	-	-	2.6	1.0	0.4	-
Delhi	8.8	4.6	3.6	0.1	-	-	30.8	0.2
Daman and Diu	1.6	-	4.9	-	-	-	-	-
Pondicherry	57.4	-	2.1	-	1.9	-	-	-
All-India	74053.4	12914.8	6620.4	9409.0	2781.4	1111.9	49652.4	1468.6

(Directorate of Economics and Statistics No.1-1(iii)/89-90-AS(E)-ES/30.11.90)

(Production in '000 tonnes)

State	Gram	Tur	Black gram	Green gram	Horse gram	Lentil	Peas	Khesari	Moth Bean	Others
Andhra Pradesh	31.3	77.7	348.5	145.0	40.1	-	-	-	-	9.2
Assam	1.5	4.9	-	-	-	-	-	-	-	44.6
Bihar	132.1	89.5	57.8	106.6	33.8	138.9	26.7	217.7	-	10.4
Gujarat	66.4	318.6	67.7	71.3	-	-	-	-	22.7	20.7
Haryana	368.0	44.3	1.0	2.8	-	9.6	2.5	-	0.3	0.1
Himachal Pradesh	1.6	-	4.1	0.1	0.8	-	-	-	-	4.0
Jammu & Kashmir	0.4	-	-	-	-	-	-	-	-	24.4
Karnataka	74.1	186.1	21.7	61.7	142.9	-	-	-	-	49.8
Kerala	-	0.2	1.6	1.1	11.5	-	3.8	-	-	0.7
Madhya Pradesh	1410.9	442.0	179.0	47.8	46.1	145.6	40.9	179.4	-	3.6
Maharashtra	334.6	711.6	180.5	302.6	99.4	4.0	2.7	19.7	46.2	33.2
Meghalaya	0.3	0.7	-	-	-	-	-	-	-	1.3
Mizoram	-	-	-	-	-	-	-	-	-	0.7
Nagaland	-	-	-	-	-	-	-	-	-	5.9
Orissa	28.8	131.3	265.2	280.0	202.4	-	7.8	-	-	98.3
Punjab	38.7	14.6	3.2	31.8	-	6.1	4.1	-	-	0.6
Rajasthan	711.5	17.3	51.3	78.9	-	6.5	19.5	-	240.2	30.4
Sikkim	-	-	1.5	-	-	-	-	-	-	5.0
Tamil Nadu	3.2	94.1	150.5	53.9	60.7	-	-	-	-	25.9
Tripura	0.3	0.7	0.9	1.2	-	0.4	0.5	-	-	2.1
Uttar Pradesh	1010.0	583.5	92.5	57.0	-	341.8	330.8	-	0.3	-
West Bengal	17.9	4.8	31.1	7.6	-	49.7	0.8	35.0	-	34.1
Andaman & Nicobar Islands	-	-	-	-	-	-	-	-	-	0.9
Dadra & Nagar Haveli	0.2	1.2	1.4	-	-	-	-	-	-	0.3
Delhi	-	0.3	-	-	-	-	-	-	-	0.4
Pondicherry	-	-	1.0	1.0	-	-	-	-	-	-
All-India	4231.8	2723.4	1460.5	1250.4	637.7	702.6	440.1	451.8	309.7	406.6

(Directorate of Economics & Statistics No. 1-1(iii)/89-90-AS(E)-ES 30 November 1990)

44 Increased production of fruit and vegetables

The production of fruit and vegetable products in the country has registered a five-fold increase during the last 20 years. The country produced 2.40 lakh tonnes of these items in 1989 as compared to just 52,274 tonnes in 1970. The number of licences to fruit and vegetable processing units has increased to 3,629 this year as against only 1,094 in 1970.

The exports of fruit and vegetable products have also shown considerable increase. The industry exported Rs. 79.48 crore worth of fruit and vegetable products in 1989 as against only Rs. 21.90 crores in 1980.

The present level of annual production of fruits and vegetables in the country is estimated to be 7 crore tonnes. Out of this, fruit contributes about 33.6 per cent. While fruits and vegetables are consumed mainly in fresh form, only a very small per centage is processed at present.

The present installed capacity of the fruit and vegetable processing industry is estimated at 7.08 lakh tonnes. Even this capacity is not fully utilised and actual utilisation is only around 34 per cent. On the other hand, fruits and vegetables worth crores of rupees are wasted every year.

The varieties which are commercially suitable for processing are not available at reasonable prices. With the result, most of the units are able to operate only for a maximum of 100 to 150 days or so in a year. Most of the units are very small and work only from season to season for specific periods.

The requirement of the industrial licence under the Industries Act has been dispensed with to encourage the growth of fruit and vegetable processing industry.
(NAFED Marketing Review 20(9-10), 1990, 8)

Production (Industrial)

45 Sugar production

According to the Indian Sugar Mills Association the country had record sugar production of 109.87 lakh tonnes during the season 1989-90 reflecting an increase of 22.35 lakh tonnes over the corresponding figure of 87.52 lakh tonnes last season.

The total offtake of sugar in 1989-90 season was 102.14 lakh tonnes (including 1.62 lakh tonnes of imported sugar) for internal consumption and 23,000 tonnes for exports as against 99.36 lakh tonnes (including 30,000 tonnes of imported sugar) for internal consumption and 18,000 for exports during the last season 1988-89. (ISMA Statistics 25 October 1990)

Export

46 Fall in spices export earnings

There has been a slight fall in spices export earnings in the half-yearly period from April to September this year compared to the previous year even as the performance has been marginally better quantity-wise.

The total spices export during the period under review amounted to Rs. 100.16 crores as against Rs. 119.84 crores last year. But in terms of quantity, the export went up to 40,637 tonnes from 39,141 tonnes.

In September, however, export showed a downtrend both in terms of quantity and value. As against 3,746 tonnes valued at Rs. 8.73 crores in September, 1989, the latest comparable figures are 3,352 tonnes valued at Rs. 7.10 crores.

In the case of pepper, the major item in the spices export basket, lower unit value realisation resulted in higher volume bringing in less returns. While export of pepper topped 16,320 tonnes compared to 13,881 tonnes during the corresponding period last year, earnings declined sharply to Rs. 54.81 crores from Rs. 72.05 crores.

On the contrary, earnings from cardamom rose handsomely following a spurt in unit value.

(Financial Express 7 December 1990, 1)

47 Export of spices from India

Name of Product	1988-89		1989-90	
	Quantity	Value	Quantity	Value
Pepper	38020	1642024	36601	1598774
Small Cardamom	760	98800	171	31941
Large Cardamom	570	211946	598	25562
Chillies	7926	187228	10713	209876
Ginger	6228	95315	7315	127153
Turmeric	18996	193757	16468	157242
Curry Powder	3093	54164	3107	60247
Coriander	8149	58896	2761	28904
Cumin	1106	37347	3252	61934
Celery	2526	26558	2524	30345
Fennel	1075	21569	2308	31607
Fennugreek	3804	38749	4773	33301
Other seeds	1132	22938	1161	12144
Garlic	4049	20472	1788	9295
Other Misce. Spices	1905	33725	5745	99906
Spice Oils & Oleoresins	487	182974	601	225377
Grand Total	99826	2736462	99886	2743608

(Spices Export Review 1989-90, 15)

48 Export of value-added spices from India

Item	1988-89		1989-90	
	Qty	Value	Qty	Value
Curry Powder	3093	54164	3107	60247
Dehy. Green pepper	107	11645	115	13211
White pepper	7	565	Neg	6
Pepper in brine	381	7329	523	9100
Frozen pepper	40	1097	113	3069
Freeze Dr. Gr. pepper	60	5330	13	4935
Other spice powders	1682	22584	4914	70804
Spice oil	39	26794	40	25170
Spice oleoresins	448	156180	560	200207
Total	5813	285688	9386	386749

(Spices Export Review 1989-90, 13)

49 Import of cumin by major countries

Country	1988		1989	
	Total Imports (in MT)	Imports from India (%)	Total Imports (in MT)	Imports from India (%)
USA	3700	4	4707	11
S. Arabia	3126	-	NA	-
Switzerland	108	-	120	-
U. K.	1448	7	1476	22
Singapore	6861	1	3645	8

(Spices Export Review 1989-90, 11)

50 Import of coriander by major countries

Country	1988		1989	
	Total Imports (in MT)	Import from India (%)	Total Imports (in MT)	Import from India (%)
Indonesia	6682	-	NA	-
USA	5938	1	2418	2
West Germany	2419	-	1987	-
U. K.	2805	11	2855	7
S. Arabia	2170	-	NA	-
Netherlands	1152	-	NA	-
Singapore	12603	16	6391	30

(Spices Export Review 1989-90, 10)

51 Import of ginger by major countries

Country	1988		1989	
	Total Imports (in MT)	Import from India (%)	Total Imports (in MT)	Import from India (%)
Japan	5241	1	3544	3
USA	4676	4	5426	14
U. K.	4345	3	4993	5
Malaysia	5182	Neg	5907	Neg
S. Arabia	5083	45	NA	-
France	1209	3	887	3
Canada	1664	-	1908	-
Netherlands	1260	4	NA	-
West Germany	1084	-	1220	-

(Spices Export Review 1989-90, 9)

52 Import of chillies and capsicum

Country	1988		1989	
	Total Imports (in MT)	Import from India (%)	Total Imports (in MT)	Import from India (%)
West Germany	8670	-	8908	-
USA	13922	7	21605	16
Japan	7892	Neg	10150	Neg
USSR	4854	-	NA	-
France	3177	Neg	4166	Neg
UK	2905	7	3364	13
Netherlands	3035	5	NA	-
Austria	1341	-	1362	-
Canada	2867	7	2988	6
Indonesia	2556	-	NA	-

* Import statistics of chillies and capsicum are clubbed together. It is estimated that Chillies constitute 1/3 rd of total capsicum and chillies imports.

(Spices Export Review 1989-90, 8)

53 Import of pepper by major countries

Country	1988		1989	
	Total Imports (in MT)	Import from India (%)	Total Imports (in MT)	Import from India (%)
USA	36575	21	37754	4
USSR	15243	92	NA	-
West Germany	12973	14	13499*	4
France	11697	28	11964	4
Japan	6212	8	NA	-
Netherlands	4306	6	6008*	1
Italy	3569	61	NA	-
Belgium Lux	2540	4	2881	2
Canada	3466	48	3140	28

* Jan-Nov only

(Spices Export Review 1989-90, 6)

54 Record coffee exports in 1989-90

India exported a record quantity of 1,30,172 tonnes of coffee in 1989-90, earning Rs. 3590 million in foreign exchange.

However, the country's coffee production declined during the last two years from a record 215,000 tonnes in 1988-89 to 120,000

tonnes in 1989-90. According to official figures of the Coffee Board, the higher exports in 1989-90 were made from stocks that had accumulated from past production.

According to the latest figures available, current year's exports totalled 43285 tonnes in the first five months till August, netting foreign exchange worth Rs. 1210 million.

Though the latest comparative figures are not available for India's productivity of coffee per hectare, it declined from 624 kg. in 1980-81 to 567 kg. in 1987-88. It had touched a record of 932 kg. per hectare in 1984-85.

In 1988-89, coffee yielded central excise duty worth Rs. 70.1 million, excise duty under section 12 of the Coffee Act worth Rs. 14.9 million, customs duty under section 11 of the Act Rs. 24.5 million and Sales Tax of Rs. 265 million.
(Economic and Commercial News 21(3), 1991, 5)

55 Export policy for basmati amended

The Government has amended the export policy for basmati rice.

Notification issued earlier, Entry 3 in appendix 92 "rice (except basmati in consumer packs upto 20 kg)" has now been changed to rice (except basmati in consumer packs upto 25 kg.).

Appendix 12 of the import-export policy (Vol.I) contains the list of export products not eligible for import replenishment licences, additional and special additional licences, export performance and export house, trading house and star trading house certificates.

For the purpose of 10 per cent import replenishment entry seven of appendix 17 under the group "foods" has been amended as "basmati rice (in consumer packs of 25 kg or less" instead of 20 kg or less".
(Economic and Commercial News 20(48), 1990, 10)

56 Cashew exports up 11 pc

Export of cashew kernels from India during January to August this year totalled 31.193 tonnes, showing an increase of 11 per cent over the same period last year, reports PTI.

The export earnings realised, appreciated by 15 per cent to Rs. 263.67 crore from Rs. 228.77 crore in the corresponding period of the previous year, with higher unit price averaging at Rs. 84.58 per kg against Rs. 81.05 per kg last year - an increase of 4.30 per cent.

According to the Cashew Export Promotion Council, about 37 per cent of the export was to the Netherlands. This was 18 per cent higher than exports in the same period in the previous year.

Exports to the USSR accounted for 28 per cent followed by USA and Japan at eight per cent each, and Czechoslovakia at four per

cent. A large part of the export to Netherlands, USSR and Czechoslovakia, is however, re-routed or resold to other countries, including the United States.

Exports in August 1990 totalled 3,879 tonnes valued at Rs. 35.48 crore as against 4,863 tonnes valued at Rs.40.07 crore showing a fall of 20 per cent in quantity and 11 per cent in value.
(The Economic Times 30 November 1990, 12)

57 CCS for blended tea

The Government has extended cash compensatory support for packet tea blended with imported varieties to increase their exports.

The CCS will, however, be valid for six months till April 25, 1991.

The existing rate of 18 per cent CCS on the export of packet tea will now be available for packet tea blended with tea imported against the advance licence issued under the present EXIM policy. At the same time, this will be subject to the cut off point of 25 per cent of net foreign exchange earned which will be enforced at the time of disbursement.

This decision will also be applicable in case of blended tea made in pursuance of offers, orders and contracts received and finalised and shipments affected on or after October 26, 1990 till March 31, 1991. This was stated in a circular issued by the Commerce Ministry recently.
(Economic and Commercial News 20(47), 1990, 8)

Import

58 Import licences for spices altered

The government has decided that export of seven more spices will be taken into account for purposes of granting import licences for cloves, cinnamon/cassia, nutmeg and mace. These spices are: fennel seed, fenugreek seed, aniseed, dill seed, asafoetida, pomegranate seed, horse-radish.

With the addition of these seven spices, the number increases to 19, according to a public notice issued by the chief controller of imports and exports on October 30.

The notification has also stated that import licences for cloves and cinnamon/cassia taken together will have a minimum value of Rs.5,000. Import entitlement for each item will be worked out separately. If any importer has imported more than one item, one combined licence will be issued but the item and value for each item would be indicated separately.

In cases where the importer had past exports for more than one item and the value of the licence on the basis of five per cent of each of the item works out to less than Rs.5,000 a licence for Rs.5,000 will be issued indicating the proportionate value of each items worked out on the basis of their entitlement, within the over-all value of Rs. 5,000.

Where the past imports was for any one of the items, import licence will be granted only for the item which was actually imported. The importer can choose separate base period for each item, the public notice has explained.

(The Economic Times 8 November 1990, 3)

59 Replenishment for imports of spice oils, resins hiked

The government has increased the import replenishment from 10 per cent to 20 per cent against the exports of spice oils and oleo resins.

A public notice amending the import export policy (Volume I) Appendix 17, was issued by the chief controller of imports and exports at New Delhi on October 25.

(Chemical Weekly 36(10), 1990, 87)

Trade Information

60 Cess on industrial products

The government is likely to impose a cess on all industrial products. The cess will be utilised to create a multi-crore fund to finance energy conservation schemes. It is also proposed to set up a centralised agency or a separate ministry to monitor implementation of the schemes initiated by the fund.

These proposals, mooted by the ministry of petroleum, are under the active consideration of the committee of secretaries. The exact percentage of the cess proposed to be imposed will be finalised soon.

(Business India 12-25 November 1990, 23)

61 Customs duty concession

A few more items of food processing machinery have been allowed to avail of the existing concessional basic customs duty of 40 per cent ad valorem, reports PTI.

According to the notifications issued in the first half of November, computer software has been fully exempted from customs duty, when imported by research institutions.
(The Economic Times 7 December 1990, 1)

62 Procurement price for tapioca

The Tamil Nadu government is considering fixing a procurement price for tapioca, the state agriculture minister, Mr. Veerapandi S. Arumugam, has said, reports PTI.

He told newsmen here yesterday that this followed complaints that farmers engaged in tapioca cultivation were being offered unremunerative price for their produce by the sago and starch manufacturers. A state-wide survey on the number of farmers engaged in the tuber's cultivation was being planned.

The minister said the Tamil Nadu state marketing committee was awaiting the Centre's clearance for setting up a Rs. two crore cold storage unit for perishable commodities at Hosur.
(The Economic Times 16 December 1990, 2)

63 Kerala to go ahead with monopoly procurement of raw cashew

The Kerala government will go ahead with monopoly procurement of raw cashewnuts during this season also.

A decision to this effect was taken by the State Cabinet here on Wednesday. The Cabinet appointed a sub-committee to go into the question of fixing the procurement price.

Monopoly procurement has always been resisted by the private cashew industry in the state. During the previous seasons, the private processors had resorted to a show-down with the government in this regard. The major point of dispute between the government and the private industry has been the procurement price. Several legal battles have also been fought between the industry and the government over the issue. While private processors argue that the monopoly procurement scheme has only helped to ruin the cashew industry in the state, the government's contention is that the scheme has helped stabilise the industry and arrest the migration of the industry to neighbouring states.

The previous Congress (I) led coalition government headed by Mr. K. Karunakaran had suspended the monopoly procurement scheme in the cashew sector. However, when the present Marxist led government assumed office in 1986, the scheme was re-introduced with added vigour.

(Economic Times 7 December 1990, 2)

64 Indians eat less meat

India is among the countries with the lowest meat consumption, according to the Foreign Agricultural Service of the US Department of Agriculture. Surprisingly, East Germans eat more meat than Americans - 211 pounds of red meat per capita in 1989 while Americans ate 168 pounds. The 3.4 billion "grain-eaters of the world's middle class get enough calories and plenty of plant-based protein, giving them the healthiest basic diet of the world's people.

(Deccan Herald 29 October 1990, 10)

65 Coffee tech institute to be set up

An Institute of coffee technology chiefly to look into the post-harvest problems of the coffee growers in the country, will be set up within two months, Shri K.N. Ardhanareeswaran, Special Secretary, Union Commerce Ministry announced while inaugurating the first session of the 97th international coffee convention of the United Planters' Association of Southern India on September 2, 1990.

(Indian Coffee 54(10), 1990, 4)

66 More oil from oil cakes

The Union Government has decided to install 3,000 modern expellers in order to recover more oil from oil cakes during the Eighth Plan. These expellers have been developed by the Council of Scientific and Industrial Research (CSIR). The scheme will involve an additional outlay of Rs. 75 crore over the outlay on traditional machines since the new machine costs Rs. 2.5 lakh more. The scheme is expected to yield an additional 1.5 lakh tonne of edible oil from the same quantity of oilseeds annually by 1994-95. The Union Government has also decided to promote integrated plants with emphasis on pre-pressing and expander technology in order to achieve higher recovery of better quality oil from oil-seeds.

(Chemical Products Finder 9(Annual), 1990, 387)

67 Development plan for oilseeds

The technology mission on oilseeds has proposed development plans, costing Rs. 390 crore during the Eighth Plan. The plan includes an estimated additional annual recovery of 2.5 lakh tonne of edible oil and additional annual production of one million tonne of extraction free from toxic substance. The plan aims at making 40,000 tonne of edible grade protein available at low prices. The plan will boost investment in technology and inputs to raise the oilseeds pro-

ductivity. The need for edible oil processing industry to modernise its operations has been stressed.
(Chemical Products Finder 9(Annual), 1990, 370)

68 Brooke Bond takes over UB food processing units

Brooke Bond India has taken over four food processing units from the UB Group of Vijay Mallya, including the high-profile market leader Kissan Products. The deal cost Brooke Bond Rs. 11.5 crore. The four units taken over by Brooke Bond are the Kissan Products factories in Bangalore and Bareilly, Herbertsons food processing division in Bombay and Merryweather Food Products. Kissan is a market leader in jams and squashes and has a major presence in the sauce, ketchups and biscuits segments also. Merryweather has an installed capacity of 4,500 tonne of processed foods annually. Herbertsons has a unit at Bhandup in Bombay with a capacity to turn out about 5,000 tonne of products per annum.
(Chemical Products Finder 9(4), 1990, 182)

69 Thapar foods to expand

Thapar Foods Ltd plans to launch an expansion programme. It proposes to instal a dal mill of 50 tonne per day capacity and a spice processing unit of five tonne capacity. The expansion programme is estimated to cost Rs.425 lakh. The company has one of the biggest and state-of-the-art flour mills of 300 tonne per day capacity and rice shelling with an installed capacity of 8.5 tonne per hour at Ludhiana. It has also planned to launch a 100 per cent export-oriented basmati rice unit of four tonne per hour at Rudrapur in Nainital district of Uttar Pradesh.
(Chemical Products Finder 9(4), 1990, 182)

70 Processed groundnut is groundnut only

The Supreme Court has held that even after undergoing the processes of drying, roasting and frying, the identity of raw groundnut kernel as groundnut is not lost, Unifin reports.

Even in the market to which it is exported and where it is marketed, it is purchased only as groundnuts (or peanuts, as they are called in the USA). May be they are two different commodities, but both are known only as "groundnuts", the court added.
(The Economic Times 5 November 1990, 2)

Food Regulation, Quality Control & Hygiene

71 Excise duty on tea

G.S.R. 655(E) - Whereas the Central Government is satisfied that according to a practice that was generally prevalent regarding levy of duty of excise (including non-levy thereof) under the Central Excises and Salt Act, 1944 (1 of 1944), the duty of excise on tea, falling under sub-heading No. 0902.19 of the Schedule to the Central Excise Tariff Act, 1985 (5 of 1986), and manufactured by the process of blending, sorting or packing from tea falling under the said sub-heading on which the appropriate amount of duty of excise leviable thereon has already been paid; was not being levied during the period commencing on the 28th February 1986 and ending with the 1st January 1989 under the section 3 of the first-mentioned Act read with any notification issued by the Central Government in relation to the duty of excise so chargeable during the said period;

Now, therefore, in exercise of the powers conferred by section 11C of the first-mentioned Act, the Central Government hereby directs that the whole of the duty of excise payable under the said Act, on such tea, but for the said practice, shall not be required to be paid in respect of such tea on which the said duty of excise was not levied during the period aforesaid, in accordance with the said practice.

(The Gazette of India Part II-Section 3-Sub-section(i), No.305, 1990)

72 Snails classification

The Agricultural Commissioner of the European Community confirmed that snails are considered as fish, since it fell under heading 0307 6000 of the Common Customs Tariff. As such the European Community treated all edible snails other than sea snails under the Common fisheries policy.

(Seafood Export Journal 22(5), 1990, 28)

73 New and revised Indian Food Standards

IS 5287 : 1989

Alcoholic drinks - country spirit
(distilled) (second revision)
Gr 2

IS 5960 (Part 15) : 1989

Meat and meat products - Methods
of test: Part 15 Determination
of L(-) - hydroxyproline content
Gr 3

IS 12758 : 1989

Cheese and processed cheese products - Determination of fat content - Gravimetric method (reference method). Gr 5

IS 12759 : 1989

Dried milk and dried milk products - Determination of insolubility index. Gr 5

IS 12829 : 1989

Mango seed kernel (solvent extracted) as livestock feed ingredient. Gr 2

(Standards India 4(5), 1990, 197)

74 Iodisation of salt

The entire edible salt requirement of the country is to be iodised in a phased manner by 1992. Already many States have notified that non-iodised salt cannot be sold in their areas. With this measure the Government hopes to have a significant effect on goitre and other iodine deficiency related diseases.

The Health Ministry has also been considering the possibility of introducing iron through some commonly used food to combat widespread anaemia, especially among women. Efforts have not yet been successful for several technical hurdles would have to be overcome. (The Hindu 13 October 1990, 4)

75 Indian seafoods low in cadmium

Scientists of the Central Institute of Fisheries Technology have undertaken several studies to determine the levels of toxic metals in Indian Seafood. In one of such studies the concentration of total cadmium were determined in 448 samples of processed fishery products comprising crustaceans, molluscs, marine fish and brackish water fish. Shrimp product, the major export item, contained on an average 0.122 ppm cadmium and 20% of crustaceans analysed did not contain cadmium on detectable level. Average content of cadmium in 68 marine fish of 9 species was 0.153 ppm and 35% of the samples did not contain the element. Of the total number of crustaceans analysed only 2% showed a level 0.5 ppm. All the 174 samples of molluscan products, except 3 canned oysters showed cadmium concentration far below the limit allowed. The average cadmium content in molluscan products was 0.552 ppm. (Seafood Export Journal 22(5), 1990, 29)

76 Anticancerous property of pure ghee

'Ghee' (clarified butter or butter oil), considered for centuries as the best source of edible fat and essential for good health and longevity, has now been confirmed by scientists as having anticancerous properties.

Dr. R.P. Taneja and Mr. T.N. Murthy from the Institute of Rural Management, Anand, Gujarat, have confirmed that ghee contains rich sources of anti-cancerous conjugated linoleic acids (CLA).

Ghee is made by heating butter or cream. According to the scientists, milk proteins provide hydrogen to linoleic acid during the heating process and catalyse the formation of CLAs - a process somewhat similar to the microbial enzymatic reaction in the rumens of cows and buffaloes.

The total CLA content of milk fats extracted by solvents from milk of cows and buffaloes is about 0.6 and 0.5 per cent respectively. The solvent extraction method does not involve either fermentation in the presence of butter milk or heating at high temperatures. Therefore, the CLA content is due to only the natural enzyme action in rumen.

The Anand researchers found that microbial fermentation during the formation of curd increased the CLA content to 1 per cent. After melting butter at 110 degrees celsius by the traditional method, the CLA content was found to be 1.1 per cent in cow ghee and 1.3 per cent in buffalo ghee. When the process was carried out at 120 degrees celsius, the CLA content improved further to 2.5 and 2.8 per cent for cow and buffalo ghee respectively.

In the cream-butter method the CLA levels were 0.9-1.8 per cent in cow and 0.7 -1.6 per cent in buffalo ghee made at 110 degrees and 120 degree celsius respectively. In the direct cream method it was 0.6 and 0.7 per cent only.

Repeated experiments confirmed that the traditional method of taking out butter from the curd and heating it to 120 degree celsius for making ghee was better than the methods followed in commercial dairies.

(P.T.I. Science Service 9(20), 1990, 3)

77 Low cholesterol level - good or bad ?

Scientists have found in recent animal and human studies that lowering cholesterol may be associated with higher levels of aggressiveness and an increased risk of mortality from accidents and suicides.

The new research may help explain a puzzle that has troubled researchers for years; while lower cholesterol levels reduce the risk of death from heart disease, they do not reduce overall mortality among those on cholesterol-lowering regiments.

The preliminary studies show that the increased mortality from accidents and suicide occurs in people who have lowered cholesterol both by medication and by diet.

(Deccan Herald 20 December 1990, I)

78 First fat-free ice cream

The American company Monsanto is now licensing what it claims is the world's first fat substitute for use in ice cream and ice cream products. The world's first fat-free ice cream for the obese will soon hit the US food market soon. A popular ice cream sandwich now contains 6 gm of fat containing 180 calories. With the new product it will have no fat and just 130 calories, reports Monsanto. (Chemical Weekly 36(12), 1990, 106)

79 'Killer cheeses' primed to fight listeria

Cheeses primed to "kill" harmful bacteria—including those that cause listeria—are now in prospect because of pioneering British research in genetics. Mike Gasson and his colleagues at the Agricultural and Food Research Council's Institute of Food Research in Norwich have identified bacterial genes that produce nisin, a natural toxin lethal to some rival bacteria.

The investigators say that their work raises the possibility of splicing the genetic material into bacteria in the "starter cultures" used for turning milk into cheese. The starter culture could then produce its own nisin, killing off other harmful strains of bacteria.

This would be a breakthrough because some soft cheeses, such as brie, may harbour *Listeria monocytogenes*, the species that causes listeriosis. Infections are generally harmless with flu-like symptoms. However, they can kill people with impaired immunity and cause miscarriages.

Explaining the problems of eliminating *L. monocytogenes* from cheese, Gasson said "You can't heat it because this destroys the product itself, and you can't add nisin to the starter culture because the cultures are themselves sensitive to nisin". The alternative now in prospect is an example of biopreservation, where you move the genes responsible for making an antimicrobial compound such as nisin into bacteria used for cheese manufacture.

Cheesemakers take milk and add chymosin (an enzyme formerly known as rennin) and lactic acid bacteria. This "starter culture" converts the milk into cheese.

"The starter culture would actually have the property of killing other bacteria", Gasson said. Also, the genetic material inserted carries a gene that confers nisin resistance to the new host, so it will not "commit suicide" by producing toxin. Gasson says that his team has identified the region of genetic material within *Lactococcus lactis*—a relative of the bacteria used in starter cultures—which makes nisin, and has even transferred it successfully to starter cultures.

Though deadly to bacteria, nisin is not known to be harmful to people. Gasson said that nisin has been used in food with no problems for the past 15 to 20 years, mainly in processed cheese and in

canning. "It's a permitted additive, but its use in this new context would need to be clarified and any safety issues addressed," he said.

Gasson said that the team was investigating novel biotechnological approaches to enhance food safety but, as yet, had not tried making cheese with the modified cultures. The regulatory status of such cheese would need to be established before the produce could be sold. Britain is almost certain to make it mandatory in the new year to notify the Ministry of Agriculture, Fisheries and Food of the sale of genetically engineered foodstuffs. Proposals for European regulations are also imminent.

(New Scientist No. 1746, 8 December 1990, 26)

80 Ban on pan masala ads on TV

The Government has banned the advertisement of pan masala on Doordarshan, official sources said here on Friday.

The advertisements have been banned in view of the recommendations made by the Health Ministry that pan masala is "not good" for health, they said.

There has been a demand for a long time, both inside and outside Parliament, that pan masala advertisements should be disallowed on the official electronic media because these give a fillip to its popularity and sale.

During recent years, while its sales have sky-rocketed, the voluntary consumers and health organisations have been carrying on a relentless campaign for its ban on Doordarshan.
(Financial Express 16 December 1990, 12)

81 Artificial sweetener may reduce appetite

Aspartame, the artificial sweetener used in diet cola and many other products, may diminish people's appetites, according to British researchers. This claim, made at a biochemistry conference, comes as a surprise to nutritionists who had believed that the sweetener had no biological activity other than its sweet taste.

Peter Rogers, from the Agricultural and Food Research Council's Institute of Food Research in Reading, and John Blundell from the University of Leeds, gave aspartame in capsules to 16 undergraduates one hour before a sandwich lunch of 1200 kilocalories. Each capsule contained 200 milligrams of aspartame - equivalent to the amount in a can of diet cola. A control group took capsules containing no aspartame.

Before the meal, both groups felt equally hungry, according to standard psychological tests. However, the group that had taken aspartame ate 15 per cent fewer kilocalories than the controls, as measured by the amount of food left on their plates.

The researchers believe that, while aspartame does not reduce hunger, it exaggerates the satiating effects of food. The experiment has been repeated six times, Rogers said. The researchers believe aspartame could eventually be used as a therapy against obesity, although they warn that much more research would be needed.

There have been numerous studies on aspartame but no one has found this effect before. One explanation, suggests Rogers, is that most of the early studies were in rats; yet the sweetener has no effect on these animals' food intake, he says.

Another possible explanation for the failure to note the effect before, says Rogers, is that the taste of sweeteners may actually stimulate appetite. The team's own research on saccharin and aspartame has found that these sweeteners do increase appetite when people can taste them, although other researchers have found no such effect (Physiology and Behaviour, vol 39 p. 247). The reason that Rogers and Blundell gave the aspartame in capsules was to avoid any possible effect of sweetness on appetite.

The team cannot provide any evidence for a mechanism by which the sweetener makes people feel full, but they say this is the first demonstration that aspartame has a biological effect other than tasting sweet. A hormone called cholecystokinin, released from the gut, is involved in the feeling of satiety after eating. The researchers speculate that receptors on cells that release the hormone in the gut wall may be sensitive to aspartame, and that the sweetener may trigger the release of additional cholecystokinin.

Erik Millstone, a researcher at the Science Policy Research Unit at the University of Sussex, says it would be misleading to put too much weight on one study. "Using single doses of aspartame in capsule form does not faithfully reproduce normal patterns of human consumption," he said.

Maureen Mackey, associate director of nutritional science at the NutraSweet Company, said she could not comment until the results had been published in a journal. But she was sceptical about the claim that aspartame could be used to treat obesity. (New Scientist No 1737, 6 October 1990, 27)

82 Healthy coffee

It took more than 133 million cups of coffee to prove it, but scientists have at last shown that four cups or more a day do not predispose you to heart disease or strokes.

The results of the two-year study on 45,589 male coffee drinkers aged between 40 and 75 contradict earlier investigations blaming coffee for coronary problems.

Walter Willett of Harvard's School of Public Health and colleagues from Erasmus University in the Netherlands report in New England Journal of Medicine (11 October, vol 323, p 1026) that the only significant risks were associated with decaffeinated coffee.

Apparently, people who drank several cups of it a day raised their risk of heart disease to 1.63 times the norm. The extra risk for drinkers of caffeinated coffee had raised risk by just 1.04.

Willett cautions, however, that his findings on decaffeinated coffee were based on small numbers. Only 1512 men who took part in the study drank large amounts of it, and of these 22 had evidence of heart disease by the end of the study.

(New Scientist No.1739, 20 October 1990, 19)

83 UK to legislate soon on glazing of frozen shrimp

The UK Department of Trade and Industry, is expected to introduce legislation to stop overglazing of frozen shell fish by June 1990 as a result of continuous appeals by shrimp processors. To protect the delicate flesh from damage, frozen shrimp need to have a minimum level of water glaze (around 10%). However, some unscrupulous processors in the UK started adding higher level of water glaze (up to 40% or more) to boost profit margins. The consensus has been that processors should be required by law to declare the net weight of glaze on every pack they sold. However, the main problem is the lack of and adequate enforcing system and checking method for the amount of glaze used.

(Seafood Export Journal 22(5), 1990, 27)

84 Esterified propoxylated glycerols (EPG) a new synthetic fat substitute

Fat like substances which are resistant to hydrolysis by digestive enzymes comprise a major category of materials under study for partial or complete replacements of fats and oils. Esterified propoxylated glycerols (EPS) are a new family of propylene oxide derivatives developed by ARCO Chemical Company 3801, West Chester Pike, New town Square, Pa. USA.

The structure of EPG is similar to that of natural fats. To produce the noncaloric triglyceride, glycerine is reacted with propylene oxide to form a polyether polyol which is esterified with a fatty acid. The first US patent covering the ingredient was issued to M. Pollard and J. White in August 29, 1989 and the company filed for patent protection in the European Economic Community (ECC) in 1988. Preliminary digestability studies and applications work indicate that EPG is resistant to enzymatic hydrolysis and that it can be substituted for fats and oil in products such as table spreads, frozen desserts, salad dressings and bakery products. The company is encouraged by the results of the toxicity/tests which eventually in 4 to 5 years will be used to petition the FDA for approval of EPG.

(Chemical Weekly 36(8), 1990, 95)

Transfer of Technology & New Industries

85 New unit to make sweeteners

A Rs. 35-crore joint sector project of the U.P. State Industrial Development Corporation and a private sector plywood industry will come up near the UP - Delhi border for manufacture of sweeteners as a substitute for sugar.

(Chemical Weekly 36(13), 1990, 52)

86 A new natural sweetener

For the first time in India, high fructose syrup and other value-added starch derivatives are to be produced from tapioca. High fructose syrup is considered a major innovation in the area of natural sweeteners. It is produced in large quantities in the United States, Canada, Belgium, Japan and South Korea and used mainly in soft drinks, food processing, confectionery and dairy and bakery products.

High fructose syrup is similar to ordinary sugar in sweetening power. It has the added advantage of higher solubility, lower microbial growth and longer shelf life of the products made from it. Usha Biotech Industries Ltd is setting up a plant in Tamil Nadu to produce this syrup.

(Deccan Herald 4 December 1990, 11)

87 Energy food unit to be launched

An energy food plant will be set up at Badaun in Uttar Pradesh with an annual capacity to produce 3,600 tonne of energy food. The foundation stone for the plant has been recently laid. Nutritious, ready-to-eat food will be produced for supply to the Government of Uttar Pradesh for distribution among children and nursing mothers. The plant will be commissioned within one year and will produce high protein food out of wheat, atta, soya flour, vitamins and jaggery/sugar.

(Chemical Products Finder 9(4), 1990, 168)

Special Article

Food irradiation: Facts or Fiction?

Claims about irradiated foods may be misleading

by Paisan Loaharanu

In modern history, people have witnessed technological progress in many fields, some of which has enabled countless human voyages in outer space, even to the moon. Some people are surprised to learn that foods processed by ionizing radiation have been on these voyages since the early 1970s, when they became part of the diets for US astronauts and Soviet cosmonauts. Considering the fears and emotions too often surrounding irradiated food on this planet, one wonders whether these outer space travellers ever asked, "What on earth are these people talking about?"

Few food processing techniques have undergone as much scientific evaluation, public scrutiny, political debate, and media attention as has the technology of food irradiation. During the course of it all, both proponents and opponents have, in many respects, made it difficult to separate the science from the fiction of food irradiation.

Proponents often call the technology a method to solve world hunger. Opponents, meantime, often claim that it is dangerous because eating irradiated food — or even living near an irradiation facility — can lead to cancer. They also think the technique will be misused to make unwholesome food appear fresh. Unfortunately, both groups far overstate the case. Food irradiation's benefits, as well as its limitations, are too well-documented in the scientific record to support such notions. In short, the record shows that the technique can help to address problems of food supply and safety — without being hazardous to the environment or human health.

Are irradiated foods safe to eat?

The most important issue raised by consumer groups, the mass media, and even a few governmental representatives is the safety of irradiated food. It covers a wide range of technical subjects, including free radicals, radiolytic products, mutagenic and carcinogenic substances, polyploidy, vitamin losses, dangerous bacteria, and toxins.

Many scientific investigations have been done on this issue:

- **Free radicals and radiolytic products.** Just like with other food processes — heating or drying, for example — chemical changes occur when foods are irradiated. The types of radiations used for treating food are energetic enough to cause ejection of electrons in the medium through which they pass. This process is called ionization. The ions and free radicals, which primarily form when ionizing radiation passes through a food, are mostly unstable. They can react with each other or with constituents of a food resulting in compounds called "radiolytic products". It is important to know that these compounds are identical or similar to compounds found in food processed by other techniques, or even in unprocessed food. There is no evidence that any of these compounds is dangerous for consumption. No compounds which are unique to irradiation of food have been identified.

- **Mutagenic or carcinogenic properties.** International groups of scientists have evaluated extensive data from safety studies of irradiated foods and have found no basis for concern. Studies include those analysing chemical changes in irradiated foods — no matter how minute — and whether they could give rise to long-term human toxicity. In these studies, extensive animal feeding tests have been carried out on a number of irradiated foods. The foods were treated at doses that would be used in practice, as well as at much higher doses. A number of sensitive tests were employed in such studies, including host-mediated assays, cytogenetic analysis, micronucleus tests and long-term multigeneration feeding studies using rats, mice, dogs, monkeys, and other animals. Many of these studies were carried out or co-ordinated by the International Project in the Field of Food Irradiation, based in Karlsruhe, Federal Republic of Germany, from 1971 to 1981. Data generated from them were evaluated by leading experts in toxicology, microbiology, nutrition, and chemistry appointed by the Food and Agriculture Organization (FAO), IAEA, and World Health Organization (WHO) in 1976 and 1980.

In 1980, a significant amount of new data on animal feeding tests and radiation chemistry were available for evaluation. On the basis of these data, the Joint Expert Committee on Food Irradiation (JECFI) of the FAO, IAEA, and WHO came to the conclusion that "irradiation of any food commodity up to an overall average dose of 10 kilogray presents no toxicological hazard; hence, toxicological testing of foods so treated is no

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longer required". It also found that irradiation up to this dose level "introduces no special nutritional or microbiological problems".

Since 1980, a number of national scientific committees have been appointed by the Governments of Australia, Canada, Denmark, France, Netherlands, United Kingdom, and United States to evaluate the safety of irradiated foods. All these committees independently have come to the same conclusions, in principle, as JECFI did. In 1983, JECFI's recommendations were further adopted by the Codex Alimentarius Commission of the FAO and WHO as a Codex General Standard for Irradiated Foods and Recommended International Code of Practice for the Operation of Radiation Facilities for the Treatment of Foods.

● **Nutrition.** Any food treatment — be it heating, freezing, drying, or even chilling — causes vitamin loss to a certain extent. Irradiation is no exception. Major food components such as protein, fat, and carbohydrates are relatively resistant to irradiation. Certain vitamins, such as A, E, and K, are relatively sensitive. Vitamin loss caused by irradiation is comparable to, or often less than, that produced by other food processes used to achieve the same purpose. A low irradiation dose required for sprout inhibition of potatoes and onions and for disinfesting insects in grains and fresh tropical and dried fruits will not cause significant loss of vitamins. For example, potatoes irradiated at 0.1 kilogray for sprout inhibition and stored at 15–20°Celsius retain more vitamin C than non-irradiated potatoes chilled at 4–5°Celsius for sprout inhibition.

It should be noted that constituents of food — for example, amino acids, vitamins, or sugars — can be sensitive to even a relatively low dose of irradiation when they are irradiated individually. These compounds are, however, more resistant to irradiation when they are present in a complex matrix of a food. Environmental factors, such as temperature and the oxygen atmosphere, are also important with regard to radiation sensitivity of such compounds. This phenomenon may explain the discrepancies in published reports on effects of irradiation on various food components.

● **Polyploidy.** No safety issue of irradiated food has been more sensationalized than "polyploidy", alleged to result from consumption of freshly irradiated wheat. Polyploidy means a multiple set of chromosomes that could imply abnormality. Human cells normally have 46 chromosomes. If they are polyploid they could have 92 or even 138 chromosomes. The incidence of polyploid cells varies among individuals. The biological significance of polyploid cells in humans is still unknown.

In the mid-1970s a number of reports were published by a group of scientists from the National Institute of Nutrition (NIN), India, on the increase in frequency of polyploid cells in rats, mice, monkeys, and even malnourished children, attributable to consumption of freshly irradiated wheat. No increase in polyploidy was

seen when irradiated wheat was stored for 12 weeks, prior to consumption. A number of institutions in India and elsewhere have tried to repeat the studies conducted at NIN based on information made available to them. None of these institutions could come up with results similar to those found at NIN.

In view of the controversy on this issue, an independent investigation committee was appointed by the Government of India. The Committee concluded in its report in 1976 that the available data failed to demonstrate any mutagenic potential of irradiated wheat. The 1976 JECFI meeting, attended by the Director of the NIN, also considered all available data and came to the conclusion that there was no cause for concern and recommended "unconditional acceptance" of wheat irradiated up to a dose of 1 kilogray for insect disinfestation. A number of national scientific committees in Canada, Denmark, France, United Kingdom, and United States also have evaluated the alleged incidence of polyploidy; they all concluded that there is no cause for concern from consumption of irradiated wheat.

Additionally, in the early 1980s, eight feeding studies using several irradiated food items, including freshly irradiated wheat, were conducted using human volunteers in China. More than 400 individuals consumed irradiated food under controlled conditions for 7 to 15 weeks. Seven of the eight experiments involved investigation of chromosomal aberrations in 382 individuals. No significant difference between the number of chromosomal aberrations in the control and the test groups could be discovered in any of the experiments. The incidences of polyploidy in those who consumed non-irradiated food and those who consumed irradiated samples were within the normal range of the overall average value of polyploid cells in participants.

● **Microorganisms and toxins.** All foods intended to be processed by physical means — whether by pasteurization, canning, freezing, dehydration, or irradiation — should be of good quality and properly handled. Most of these techniques cannot eliminate all microorganisms and their toxins. Processing techniques, therefore, can neither replace good manufacturing practices (GMPs) nor are they applicable to all foods. Foods such as grain, meat, fish which can be contaminated by certain pathogenic microorganisms have to be strictly handled according to relevant GMPs — for example, chilling, ensuring low moisture content, and proper packaging and storage — before, during, and after processing by any technique. Food industries in general are fully aware of not only how to handle food but also what could happen if it is mishandled.

Despite the importance of GMPs, they alone cannot ensure the hygienic quality of a number of foods, including chilled and frozen poultry, pork and other red meat, some seafood products, and spices. Such foods can serve to spread contamination of pathogenic and spoilage microorganisms to other food, some of which are consumed raw, such as fruits and vegetables, during prepa-

MARKETING TRIALS OF IRRADIATED FOODS

The most vocal opponents of food irradiation would have people believe that consumers overwhelmingly reject the technology. This is far from the truth. Marketing trials conducted in 14 countries since 1984 have found that consumers not only buy irradiated foods when given the opportunity, but in many cases actually prefer the irradiated product. Earlier trials conducted in Canada (1966, 1967), Hungary (1980-84), Italy (1976), and South Africa (1978, 1979) found similar positive responses from consumers.

	Irradiated food items	Quantity (tons)	Date of testing	Place	Comments on results
ARGENTINA	Onions	55	1985-88	Buenos Aires & Bahia Blanca	Consumers preferred irradiated onions. 95% said they would like to buy them again.
	Garlic	1	1985-86	Buenos Aires & Bahia Blanca	Consumers showed no objection to irradiated products.
	Garlic powder	2.3	1987-88	Buenos Aires	Consumers showed no objection to irradiated products.
BANGLADESH	Potatoes	60	1985-88	Dhaka & Chittagong	More than 70% of consumers preferred irradiated foods because of better quality.
	Onions	85	1984-88	Dhaka & Chittagong	More than 70% of consumers preferred irradiated foods because of better quality.
	Dried fish	3.5	1985-88	Dhaka & Chittagong	Consumers preferred irradiated products because of better quality.
	Pulses	8	1986	Dhaka	Consumers preferred irradiated products because of better quality.
CHINA	Spirit from sweet potatoes	12 478	1984-89	Sichuan, Beijing, Lanzhou, Lasha, etc.	Consumers showed no objection to irradiated products.
	Sausage	200	1984-86	Sichuan, Guangzhou, Beijing, etc.	Consumers showed no objection to irradiated products.
	Apples	500	1984-88	Shanghai, Tianjin	Consumers preferred irradiated apples.
	Potatoes	800	1984-89	Shanghai, Henan	Consumers showed no objection to irradiated products.
	Onions	1250	1984-89	Shanghai, Tianjin	Consumers showed no objection to irradiated products.
	Garlic	4200	1984-89	Zhengzhen, Shanghai	Consumers showed no objection to irradiated products.
	Hot pepper and products	200	1984-89	Sichuan	Consumers showed no objection to irradiated products.
	Oranges	35	1984-88	Beijing	Consumers showed no objection to irradiated products.
	Pears	5	1985-87	Shandong	Consumers showed no objection to irradiated products.
	Potatoes	82.3	1988	Havana	Consumers showed no objection to irradiated products.
CUBA	Onions	16.2	1988	Havana	Consumers showed no objection to irradiated products.
	Garlic	10.5	1988	Havana	Consumers showed no objection to irradiated products.
FRANCE	Strawberries	3	1987	Lyoh	Consumers preferred irradiated strawberries in spite of higher price.
		10	1988		
GERMAN	Spices	1	1985	Leipzig	Consumers showed no objection to irradiated products.
DEM. REP.	Chicken	10	1987	Schönenbeck	Consumers showed no objection to irradiated products.
INDONESIA	Dried fish	1.4	1986-88	Jakarta	Consumers showed no objection to irradiated products.
PAKISTAN	Potatoes	8	1984	Peshawar	Consumers showed no objection to irradiated products.
	Onions	12	1986-87	Peshawar	Consumers showed no objection to irradiated products.
PHILIPPINES	Onions	7	1984-86	Davao & Manila	Consumers showed no objection to irradiated products.
	Garlic	6	1985-87	Manila	Consumers showed no objection to irradiated products.
POLAND	Onions	6.5	1986-88	Poznan & Warsaw	95% of consumers said they would like to buy them again.
	Potatoes	2.5	1987	Poznan	Over 90% of consumers preferred irradiated potatoes.
		5.7	1988	Poznan & Warsaw	Consumers preferred irradiated potatoes.
THAILAND	Nham (fermented pork sausage)	29	1986-88	Bangkok	Irradiated food preferred over the non-irradiated product at a ratio of 10:1 in spite of higher price. 95% of consumers said they would like to buy them again.
	Onions	800	1986-87	Bangkok	Consumers preferred irradiated onions and garlic because of quality.
	Garlic	0.4	1986-87	Bangkok	
USA	Mangoes	2	1986	Miami, Fl.	Irradiated mangoes (sold at same or higher price) were preferred because of higher quality.
	Papaya	0.068	1987	Irvine & Anaheim, Ca.	Irradiated papayas were preferred at a ratio of 11:1; 69% of consumers said they would like to buy them again.
	Apples	0.270	1988	Missouri	Irradiated apples were preferred because of quality, even though they were sold at higher price.
YUGOSLAVIA	Herbal extracts	0.250	1984-85	Belgrade	Consumers showed no objection to irradiated products

ration for consumption. Also, there are strict microbiological specifications required for some of these food items, especially in international trade. In particular, the absence of pathogenic microorganisms such as *Salmonella* is required in most food products.

Why food irradiation is used

Concerns about public health and the quality of food are among reasons why food irradiation is being used. Applications cover a range of products, including:

- **Spices and vegetable seasonings.** As early as 1986, international spice firms recognized the "irradiation technique as a unique means of controlling insect infestation and microbiological contamination", as stated at the First Meeting of the International Spice Group held in New Delhi in 1986. The group concluded that the use of irradiation on spices should be encouraged to eliminate spoilage, pathogenic microorganisms, and insects. The interest of spice trading companies in the use of irradiation has increased considerably since then, in view of the prohibition and restriction of the use of the chemical fumigant, ethylene oxide, in major spice importing countries. Irradiation now is being used to ensure the hygienic quality of spices in 17 countries.

- **Poultry and its products.** While many poultry producers do not like to admit that their fresh and frozen poultry meat are contaminated with *Salmonella* and related microorganisms, the problem is real worldwide. Between 30%–40% of poultry meat being sold in the market anywhere is contaminated with these organisms. The problem is not unique to poultry, as fresh and frozen red meat are also contaminated by these organisms, possibly to a lesser degree.

Many experts agree that the contamination of certain foods of animal origin, in particular poultry and pork, by organisms such as *Salmonella*, *Campylobacter*, and possibly *Listeria* cannot be avoided by using prevailing GMPs in the production, processing, and handling of these products without entailing an exceptionally high cost. They believe that, where such foods are important in the epidemiology of food-borne diseases, irradiation must be seriously considered as a valid option for pathogen control. Among the best arguments for irradiation of poultry is the one submitted by the Convention of Scottish Local Authorities in its comments on the Proposed Directives for Control of Irradiation of Foodstuffs issued by the Commission of the European Communities (CEC): "The Convention strongly supports the irradiation of poultry meats as the poultry industry has found it impossible to produce a product free from food poisoning organisms. The advent of irradiation of poultry meat, in the Convention's opinion, is likely to be as effective as the compulsory pasteurization of milk which took place in Scotland in 1983 and immediately brought about a large reduction in food poisoning from that source."

In the United States, the Food and Drug Administration (FDA) has estimated that up to 81 million cases of food-borne diarrhoeal diseases occur annually. The estimated economic loss due to *Salmonellosis* alone may be as high as US \$2300 million per year. In comparison, the estimated losses due to *Salmonellosis* in Canada and the Federal Republic of Germany are close to US \$85 million and US \$110 million respectively, per year. Any effective treatment against such preventable food-borne disease should not only be encouraged but applied.

In 1987, the United States Department of Agriculture (USDA) Food Safety and Inspection Service petitioned the FDA to approve the use of irradiation of poultry meat, and the FDA has now given its approval. Commercial uses could follow. Currently, commercial-scale irradiation of poultry and poultry products has been carried out in Belgium, France, and the Netherlands.

- **Red meat and fishery products.** While incidence of *Salmonella* and *Campylobacter* contamination in red meat may not be as high as in poultry, parasitic infection of red meat by *Trichinella*, tapeworm, and *Toxoplasma* occasionally occurs in many countries. Such infection has made certain red meat culinary dishes, such as beef tartar, high-risk items. Veterinary inspection against these parasites in such meat prior to marketing is not foolproof. In Thailand, for example, irradiation is used to combat problems in a local delicacy called Nham, which is a fermented pork sausage, commonly consumed without cooking.

Frog legs are also a good candidate for irradiation. Frogs have the habit of living in an unhygienic environment and thus become contaminated by pathogenic microorganisms. Common GMPs used during processing cannot remove all contamination of these organisms. As a result, hundreds if not thousands of tonnes of frozen frog legs have been irradiated in Belgium, France, and the Netherlands in the past several years.

Seafood products normally are not contaminated with pathogenic microorganisms unless they are subjected to frequent human contact during processing. One item usually contaminated with pathogenic microorganism is cooked, peeled frozen shrimp. This product is cooked, hand peeled, frozen, and normally served as a prepared meal without further cooking. Irradiation is being used to ensure the hygienic quality of this product in Belgium and the Netherlands. Fish, especially fresh-water fish, can harbour a number of parasites. In the Far East, the population has the habit of consuming raw fish and millions of people are infected by various parasites, the most common of which is liver fluke. In Thailand alone, up to 7 million people in the Northeast provinces are infected by this parasite, which could result in an economic loss as high as US \$600 million per year.

- **Tropical fruits.** Tropical and semi-tropical fruits are naturally infested by several species of fruit flies which prevent them from entering into countries with strict plant quarantine regulations, such as Australia,

Control of irradiation facilities

At the international level, the Codex Alimentarius Commission of the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) of the United Nations, which represents 137 governments, has issued provisions for controlling irradiation facilities.

What has been done to promote adherence to these provisions?

A joint body of the FAO, IAEA, and WHO known as the International Consultative Group on Food Irradiation (ICGFI), and the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture have initiated a number of activities. They include:

- *International Register of Licensed Food Irradiation Facilities.* The register identifies facilities that meet ICGFI criteria for operation. It is maintained and updated by the Joint FAO/IAEA Division. Information can be made available to governments upon request.

- *Food Irradiation Process Control School (FIPCOS).* ICGFI organizes training courses for operators, plant managers, and technical super-

visors of irradiation facilities, as well as for food control officials.

- *Certification of Treatment.* The Codex Standard requires that irradiated foods, whether prepackaged or not, are accompanied by relevant shipping documents to identify who has irradiated the food, when, and where. ICGFI now plans to develop and recommend a standard certificate which includes all this information for use in food trade.

- *Detection.* A number of national authorities have demanded detection methods to identify whether food has been irradiated and, if so, whether the treatment was done according to regulations. Recent research carried out in some countries has shown that a few methods — such as chemo- and thermoluminescence and electron spin resonance (ESR) spectroscopy — may be suitable to identify some irradiated spices and food containing bones. The Joint FAO/IAEA Division and the European Commission are sponsoring research work in this area to develop more methods for detecting irradiated food items destined for international trade.

Japan, and USA. Ethylene dibromide, a widely applied fumigant against fruit fly infestation, has been banned in most countries. An effective alternative treatment is urgently required to overcome this problem. Among several alternatives available, irradiation appears to be the most promising in view of its effectiveness on most fruits. Fruit exporting countries such as Chile, Mexico, Philippines, and Thailand show strong interest in the use of irradiation. The USDA recently allowed irradiation for treating papaya from Hawaii to overcome fruit fly infestation. FAO has already published a recommendation on the use of irradiation as a quarantine treatment in its International Plant Quarantine Treatment Manual.

Who uses food irradiation

Twenty-four countries are irradiating foods or food ingredients destined for commercial use. The list includes a number of countries in Europe. The Federal Republic of Germany, while prohibiting the sale of irradiated food in the country, is irradiating commercial quantities of spices for export. Other European countries which are also irradiating different food items for commercial use include Finland, German Democratic Republic, Hungary, Norway, USSR, and Yugoslavia.

The number of countries which use irradiation to treat certain food items is growing, as are the quantities of food treated. Three more countries (Bangladesh, Côte d'Ivoire, and Viet Nam) plan to use food irradiation when the construction of their facilities is completed. Other countries, including Algeria, India, Malaysia,

Pakistan, Peru, Philippines, and the United Kingdom have serious plans to use food irradiation commercially.

Currently about 160 multi-purpose irradiators are being used worldwide, mostly for sterilizing disposable medical products; about 50 of these also process food part of the time. By the end of the 1990s, an estimated 80 facilities could be in use in about 40 countries to irradiate food or food ingredients for commercial use.

Though still small, the commercial use of food irradiation has become significant enough to warrant a new direction in diffusion of this technology. National and international organizations are giving emphasis to issues such as harmonization of regulations, trade control, process certification, and irradiation registration. The safety and effectiveness of the technology have firmly been established internationally.

At a crossroad

Food irradiation is at a political crossroad. In one direction, it is moving forward supported by overwhelming scientific evidence of its safety and benefits to economy and health. In the opposite direction, it threatens to be derailed by misleading claims about its safety and usefulness. Whether people will ultimately benefit from the use of irradiation to help fight serious food problems, or whether they will allow the technology to go to waste, will be determined by how successful people are in separating the facts from the fiction of food irradiation.

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Raw Materials

88 French grapes for Indian wine

"When you speak of wine, you speak of grapes. For good wines you must first make good grapes".

This is Monsieur Georges Vesselle speaking. He should know what he is talking for his family has been in the wine-making business for four centuries.

A shared passion for sparkling wines is what brought Mr Vesselle and Mr Kapil Grover of the Bombay-based Hindustan Export and Import Corporation Private Ltd together in a unique venture-making Indian wine with French grapes.

Not that our desi grapes are no good. They are very good as table grapes but not good enough (so it seems!) for conversion into Frenchy, French wine. The ambitious Mr. Grover wants to carry wine to the Champagne country. Yes, export is his prime target. So, he invited Mr. Vesselle to have a look-see at his vineyard near Bangalore (where else?).

The tie-up took off like Ariane rocket. Some 20 varieties of French grapes were planted in Mr Grover's nursery. Whenever the plants bore fruit, oenologists (experts on wines) airdashed to Bangalore, pressed the grapes and performed the first vinification. The juice was sent to France for laboratory tests. Satisfied, Mr Vesselle selected varieties suitable for commercial production and flew 30,000 plants (supplied gratis) to Bangalore. Two-thirds was lost because of hassles, including Customs clearance. But, what was saved is doing well and in a month or so is expected to yield about 50 tonnes. New cuttings generated in Bangalore have shown a high rate of survival, raising hope of a harvest of 500 tonnes by next year and around 1,000 tonnes in 1993.

Hindustan Export and Import was in luck's way as the Union government liberalised the issue of licences for production of potable alcohol from non-molasses sources. The Karnataka government having cleared the project from all angles, an industrial licence from the Centre shouldn't be long in coming. Hopefully, oenophiles in India will also be given the chance of sipping Indian wine of French quality!.

(The Economic Times 18 February 1991, 7)

89 Genetic method for sweeter fruits

A new genetic engineering method called 'Transwitch' could lead to sweeter fruits and vegetables as well as plants with longer shelf life according to reports from DNA Plant Technology. The new technique enables plant breeders to 'switch off' expression of specific genes, allowing scientists to alter the sweetness and shelf life of fruits and vegetables or the fatty acid composition of edible oils.

'Among the objectives are enhancing the sweetness of corn and other vegetables by reducing enzymatic activity that turns sugar into starch' reports Dr. John Bedbrook of DNA Plant Technology (DNAP). The company's researchers are also improving the fatty acid profile of canola oil by limiting the enzymatic activity that leads to the production of certain saturated fats.

DNAP researchers are also working on extending shelf-life by blocking the production of chemicals that trigger the ripening process. The Transwitch process begins with the identification and cloning of a specific gene in the plant cell. The duplicate gene is then reinserted in the chromosome. The 'double gene' has a paradoxical effect. Instead of twice the expression of particular characteristic, the genes frequently cancel each other, eliminating the trait.

(Chemical Weekly 36(22), 1991, 94)

90 Organically grown tea marketed

'Natureland' the world's first organically grown tea was first exhibited by London Hert and Spire Co. at the New York's International Fancy Food and Confection Show last August. 'Natureland' is also Britain's first organically grown tea. It is grown in the Livingstonia Mountains of Tanzania without pesticides or artificial chemicals, forcing the bushes to ripen slowly and producing a more flavourful tea.

The tea is available in Britain in packs of 20 and 40 bags in a package bearing the Organic Farmers and Growers Seal of approval certifying that the tea meets the strict standards of this group dedicated to natural methods of cultivation and farming. The tea is the first in an anticipated line of organic teas. In addition to the UK, it will soon be available in Australia, Canada and the USA. (Food Engineering International August 1990, 16)

Storage and Infestation Control

91 Food irradiation dangers

Food irradiation is seen by many in advanced countries as a cover up for sloppy standards when more should be done about the acute problems caused by intensive farming and fast food technology. Food laws have not kept pace with fast food, TV dinners and microwave ovens. The modern industrial homosapiens live in a cook/chill society and now seem to be facing the consequences.

Food irradiation kills most of the bacteria that occur naturally in food. This may destroy even the friendly microorganisms essential for normal good health, which can be pointed out as a negative point against food irradiation. The process also slows down the development of plants by affecting the way in which their cells divide or by inhibiting growth hormones. The overriding concern in Britain today is that irradiation will reduce the nutritional value of food or even may make it dangerously radio-active by accidental over dosage of radiation.

Irradiation can oxidize fats and so can turn food rancid. It can also break down proteins - but the low levels recommended for use on food should ensure that this does not happen. But radiation does destroy a proportion of some vitamins though estimates vary, ranging from 4% to 40%.

Another fear expressed by consumers in Britain is that irradiation might make microbes mutate into a more dangerous form. However, this is unlikely unless an irradiated population of bacteria is allowed to grow and be irradiated again, so encouraging strains that are resistant to radioactivity. Another fear of consumers is that the introduction of food irradiation in a big way may lead to lowering of hygiene standards adhered to stringently at present on farms and slaughter houses.
(Chemical Weekly 36(25), 1991, 97)

92 Chitin for fruit preservation

Crabs, lobsters, shrimps and other shellfish could provide a cheap and abundant raw material for a preservative that extends the shelf life of fruit. Because the preservative is derived from natural sources, it may be more acceptable to consumers than existing synthetic preparations.

Last February, the US Environmental Protection Agency withdrew Alar, a synthetic preservative and growth regulator sprayed on apples, after receiving reports that a breakdown product of Alar caused tumours in mice. Christina Anne Carolan, a researcher at Queen's

University Belfast, said last week at the annual research meeting of the Institution of Chemical Engineers in Cambridge that she and colleagues have developed a preservative from chitin, the hard component within the shells of crustaceans. "Chitin is second only to cellulose as the most abundant biopolymer in nature," she said.

Carolán and colleagues have chemically modified a derivative of chitin, called chitosan, so that it dissolves in water to form a transparent gel. Apples coated with the gel stayed fresh for at least six months.

Carolán and colleagues make the preservative—which has the chemical name N,O-carboxymethyl chitosan (NOCC) by reacting chitosan with monochloroacetic acid under alkaline conditions. A patented synthesis for NOCC already exists, but the product from this route has only limited application as a preservative because it biodegrades after two months. NOCC that has been produced using this technique has been approved by the Environmental Protection Agency as a seed coating to increase crop yield. But by varying the reaction conditions, the Irish team succeeded in making the biopolymer with slightly different structure. This type of NOCC had a shelf life of at least six months.

Carolán and colleagues confirmed this by comparing the quality of apples coated in solutions of NOCC made by the two methods with controls. The controls included apples "wrapped in newspaper and put in boxes in the garage", said Carolán. The only apples still palatable after six months were the ones coated in the new form of NOCC. "They were as fresh as the day they were coated," according to Carolán. Apples coated with the old form survived just 10 weeks.

She says that the new gel is permeable to some gases and vapours but not others. It traps carbon dioxide, which prolongs the shelf life of the apple, and excludes oxygen which rots the fruit. (New Scientist No.1752, 1991, 31)

Food Additives

Cellulose for cakes

James River Corp of the US has developed Solka-Floc, a powdered cellulose which increases the volume and improves the texture of cakes. One per cent powdered cellulose when added to the batter shows a volume increase of approximately 14%. The enhanced cake volume is believed to be the result of the powdered cellulose stabilising the foam in the cake batter.

It is also reported to improve strength, crumb structure, and resistance to penetration and shear. The ingredient is flavourless, non-caloric and consists of 99% pure dietary fibre. (Business World 13-26 February 1991, 16)

94 A new promising sweetener produced by employing beta-glucuronidase enzyme

Researchers at Marusan Kaser Co. (Japan) in collaboration with researchers at Osaka Municipal Research Institute have developed a biotech process for producing glycyrrhetyl nonglucoronide material possessing high level of sweetness.

This new sweetening agent was synthesized by making 2 yeast derived enzyme (B-glucuronidase) react with glycyrrhizin (main ingredient of licorice extract). The product's sweetness is about 5.5 and 1,000 times that of glycyrrhizin and sucrose respectively.

Glycyrrhizin consists of glycyrrhetic acid and glucuronic acid. Glycyrrhetyl monoglucuronide is obtained by removing glucuronic acid from glycyrrhizin. The researchers, as a first step found that B-glucuronidase enzyme is effective for separating glucuronic acid from glycyrrhizin. It was also known to researchers that B-glucuronidase (available as research reagent) decomposes the targeted glycyrrhetyl monoglucuronide into glycyrrhetic acid.

As a follow-up step, the company's researchers scrutinized soil microorganisms which are compatible with culture media containing glycyrrhizin as the only carbon source. As a result, it has found that B-glucuronidase produced by *Cytophaga* magnus is suitable for production of the target material.

The researchers are now endeavouring to find out the optimum conditions for enhancing the activity of the above enzyme to develop a commercially viable process for producing the ultra-low calorie sweetener capable of satisfying the need for health-conscious consumers for natural sweetener. Aqueous solution of glycyrrhizin (4%) has sweetness 170 times that of sucrose. The product is extensively used in Japan as a sweetener and as an agent to mitigate the saltiness of soy sauce and soybean paste. (Chemical Weekly 36(23), 1991, 94)

95 Low carbohydrate beer

A genetically engineered yeast which can ferment diet beer has been developed at the Brewing Research Foundation's laboratories in Nutfield, Surrey. Low carbohydrate beers are currently made by adding the enzyme glucoamylase from the microorganism Aspergillus niger to the fermentation. The enzyme then breaks down the dextrin molecules of beer into fermentable glucose.

Researchers at the Foundation have cloned the glucoamylase gene from Aspergillus niger and inserted it into the brewing yeast so that

the yeast can produce the glucoamylase itself. The high alcohol, low carbohydrate beer, known as Nutfield Lyte, tastes 'very acceptable' said the Foundation's director Professor Bernard Atkinson, and is currently being brewed in pilot fermenters at the labs.
(Chemistry and Industry No.18, September 1990, 559)

96 Enzyme to digest lactose

Raptakos Brett and Co. is soon launching a product called 'Nolac'. It is basically lactase enzyme, the function of the enzyme being degradation of lactose (the main ingredient in milk) into lower sugars.

The basic reason why children begin to hate milk as they grow, say sources in the company, is that, with age the amount of lactase enzyme being produced by the body decreases. Hence with age, the ability of a person to digest milk also decreases, therefore, leading to heaviness in the stomach and other problems when milk is taken. When this happens repeatedly, children begin to blame all milk for all their ills and hence refuse to take it. Now, two drops of 'Nolac' added to the milk before ingestion will ensure the hydrolysis of lactose in the milk which will decrease related problems.

This will also prove beneficial to elderly people who are unable to digest milk after a certain age. Milk, being a major source of calcium, not being able to take it means that these people are deprived of quite an amount of calcium, so essential for bone development.

(Financial Express 29 March 1991, 5)

97 Milk fortification programme

The programme of milk fortification with vitamin A started by the Food Department has been given major thrust with the aim of combating the ocular diseases, especially among children.

Inadequate intake of Vitamin A is the main reason behind the ocular diseases like impairment of vision, blindness and other nutritional diseases.

In the milk supplied by organised dairies throughout the country, the fat is extracted to a great extent during processing. This results in the depletion of vitamin A content in the milk.

Normally, buffalo milk contains about 160 iu in 100 gm and cow 175 iu in the same quantity of vitamin A. To begin with, the programme was launched by Mother Dairy in Delhi in 1980 and later extended to the Delhi Milk Scheme.

The scheme is presently in operation in 45 dairies in 16 States and the Union Territories of Delhi and Pondicherry. However, there have been instances in practically all dairies where the supply of fortified milk has not been regular due to irregular availability of vitamin A.

Also, the on-going scheme does not cover rural areas in the country where unprocessed milk is generally available with vitamin A naturally present.

(Financial Express 1 April 1991, 8)

Processes

98 An explosive start to fast-maturing cheeses

Cheeses that mature in days instead of months are now in prospect thanks to the development of so-called "exploding starter cultures", which may also lead to new types of cheeses. These new cultures are identical to the conventional bacterial cultures that cheese makers add to milk to make it ferment into cheese, except that the bacteria have been endowed with an extra gene that makes the cells of the culture disintegrate, liberating enzymes which give cheese its flavour.

Normally, the bacteria take months to break down after the preliminary phase of fermentation, so the enzymes that impart flavour are locked away during that time. Mike Gasson, Claire Shearman and Karen Jury at the Agricultural and Food Research Council's Institute of Food Research in Norwich have engineered into the bacteria in the cultures a viral gene which, when activated, makes the bacteria self-destruct. The investigators are now seeking a "switch", such as a temperature change or a variation in salinity, to trigger the foreign gene into action.

Gasson explains that the source of the gene is a virus that naturally infects the lactococcus bacteria used in cheese manufacture. Ironically, the virus is normally considered a difficult industrial problem. Some cultures are vulnerable to the virus, called a bacteriophage, and this limits a cheese maker's choice of starter culture.

Gasson's team have turned the characteristics of the bacteriophage to their advantage. They isolated the gene within the phage that codes for the manufacture of lysin, an enzyme that causes the walls of an invaded bacterial cell to break open.

Lysin plays a key role in the survival and spread of the virus, which hijacks the genetic machinery of an invaded cell and makes copies of itself. To spread to other bacterial cells, the newly created viral parasites need to escape from the original host cell. They do this by manufacturing lysin. "We have exploited the lysin gene to create starter cultures that spontaneously break down once they have grown", says Gasson.

His team is seeking regulatory approval before testing the genetically engineered lactococcus in cheese maturation experiments. But Gasson expects the "exploding starters" to broaden the choice of starter cultures, allowing cheese makers to make tasty new cheeses in a fraction of the time it takes normally. In other areas of biotechnology, the same technique could be used as a controlled means to kill genetically engineered bacteria, preventing the release of viable microorganisms into the environment.
(New Scientist 16 March 1991, 28)

Byproducts and Waste Utilization

99 Plastic waste for power generation

Mitsui Petrochemical Industries Ltd., has begun to consider building an electric power plant designed to burn plastic waste, thereby generating electric energy.

The firm has been intent on promoting disposal of plastic waste and established last September a relevant committee, which has been endeavouring to set up a treatment system for plastic waste containing polyethylen and PET resin.

In Japan, a little over 40% of combined plastics production ends up as waste. Roughly 12% of the plastic waste is recycled, 23% is buried and the remaining 65% is incinerated. 20% or more of the plastic waste burnt is changed into electric power. The power-generation efficiency concerned is still low and the company intends to further raise it.

When it comes to electric power generation, plastic waste is burnt alone or is incinerated in combination with other refuse (paper, etc.) and fuel oil. The company aims to employ the latter method and build related facilities as part of a private power plant at the Tahara factory.

Plastic-waste problems are attracting a lot of interest all over the world, particularly in advanced countries. McDonald's Corp - the world's largest fast-food chainstore - has decided to stop using polystyrene vessels and its Japanese subsidiary has set itself to taking the same step. Daiei - Japan's largest supermarket chain operator - is moving toward reducing use of plastic shopping bags. (Chemical Weekly 36(24), 1991, 133-4)

100 Alcohol from fungus and insect infected maize

Spoilt maize which is unfit for human consumption is emerging as a potential source of alcohol, report researchers from Gulbarga. Usually, maize that has become spoilt due to improper harvesting, poor storage conditions and attacks by a number of fungi and insects is used as animal feed or manure.

The new finding that fungus or insect-infested maize can be better utilized as a substrate for ethanol production paves the way for a more economical method of using the waste, report R.C. Kanta and Y.F. Neelgund in "Current Science". The two scientists successfully fermented alcohol from spoilt grains using two yeast enzymes, one from Saccharomyces cerevisiae and the other from Zymomonas mobilis. Samples of the spoilt grains were randomly collected from different warehouses, storehouses and grain shops.

The Gulbarga team first prepared a slurry of the grain flour, using water, bacterial alpha-amylase, and small amounts of calcium chloride and sodium chloride. The hydrolysed slurry was saccharified and treated with fungal amyloglucoside (glucozyme) enzyme. Finally, the fermentation was carried out using Saccharomyces cerevisiae and Zymomonas mobilis. The study reveals that S.cerevisiae var. ellipsoideus is more efficient than Z.mobilis in bioconversion of spoilt maize grains to alcohol.

The fermentation efficiency ranged from 97.08 to 97.58 per cent when using S.cerevisiae and 92.31 to 92.44 per cent for Z.mobilis. The fermentation efficiency for unspoilt, healthy grains is only slightly higher, recording 97.73 per cent in the case of S.cerevisiae and 93.87 per cent in the case of Z.mobilis.

Describing their observations as "encouraging", the scientists said using spoiled grains for alcohol production rather than animal feed or manure in developing countries would be a "wiser concept". (P.T.I. Science Service 10(4), 1991, 2-3)

101 Methane from food biomass

The Thermo-chemical Environmental Energy System (TEES), a low-temperature catalytic gasification process, converts wet biomass and other organic material into methane. The system can use spent grain from breweries, potato peels, apple and grape pomace, cheese whey and wastewater from processing fruits and vegetables. TEES pumps a water slurry of feedstock material through a catalytic reactor at 350° C and

3,000 psig where it is converted into methane and carbon dioxide. Electricity is produced through a let-down turbine generator. Methane and CO₂ are separated on downstream side of the generator. Depending on the feedstock used, 90-99.9% conversion was obtained. (Documentation Bulletin No.81, 1990, 15)

Equipment and Machinery

102 Cookware of anodized aluminium

One reason why aluminium (Al) became popular for cookware is that it is an excellent heat conductor. Heat spreads quickly and evenly across the bottom, up the sides and across the cover to completely surround the food.

Now cookware manufacturers in USA have developed a process for treating aluminium that retains the heat conductivity properties of the metal, but changes Al in other ways.

The process, called anodization, involves a series of electrochemical baths that thicken the oxide film that forms naturally on Al. This supplemented coating hardens the metal, making it more scratch resistant. Food barely sticks on the hard smooth surface of this altered aluminium making it easier to clean.

Commercial Aluminium Company, the manufacturer of Calphalon, a best selling brand of anodized aluminium cookware, claims that a final stage in the anodization process 'seals the aluminium' preventing any leaching into food. Anodized Al cookware does not react to acidic foods, so these pots and pans are top choices for cooking rhubarb and sauces with tomato, wine and lemon juice among US housewives.

Anodized aluminium cookware will have ample market in India. As Teflon coated non-stick cookware are very expensive, anodized aluminium will be a cheap economical substitute for non-stick cookwares.

Indian entrepreneurs should look in this direction for diversification in aluminium cookwares. (Chemical Weekly 36(25), 1991, 98)

103 Versatile cooker for meat and meat products

A commercial cooker unit which can steam-cook, dry-cook or flash-roast hams, meats, poultry (either whole or jointed), faggots, Scotch eggs, fish and shellfish has been developed by a British company. The Mastercook Cooker from Premier Processing Equipment is of all-stainless steel construction and is electrically heated by a system of finned elements. Sterile steam for the humidified cooking programme is produced by spraying water over the elements. An important feature is the fan assisted circulation system which reduces the temperature differential between any two points in the oven to below 1°C ensuring particularly even cooking. The Mastercook is fitted with an automatic control system, which allows the presetting of such factors as delay time, cooking time, cabinet temperature and humidity. An optional internal probe is available to make possible cooking to a selected central core temperature. There is also an option of having a cold shower system linked to the control system to allow a product to be cooled rapidly at the end of the cooking cycle. The automatic control system can be programmed to maximise output. Where, for example, there is an eight-hour cooking programme for hams, upto three loads can be processed in a 24-hour period. Two models of the Mastercook are available. One has a capacity of 35-40 hams weighing between 6.8 kg and 9 kg disposed on five trays. The other is a trolley-loaded version which has a 70-80 ham capacity and is quicker to load and unload.

For further information write to: Premier Processing Equipment Ltd., Manor Road, Marston Trading Estate, Frome, Somerset BA11 4BN, U.K.

(Industrial Products Finder 19(5), 1991, 58)

104 Microwave oven in industry

Food production companies in Australia and overseas will have the chance to reduce costs and increase efficiency, thanks to an Australian engineer who has moved the microwave oven from the kitchen to the factory. International confectionery group, Mars, is the first food company to use the industrial-scale microwave heating unit developed by Associate Professor Nguyen Tran of Deakin University in Geelong, Victoria.

Uses for the Tran system include baking bread, pasteurising milk, roasting cocoa beans, drying pasta, tempering frozen foods, curing bacon and sterilising cream. It has been used also to cook mussels. The unit can be modified or fine-tuned to cope with most tasks in the food or liquor industry that require heating or pasteurisation of ingredients.

The potential of microwave power for a wide range of industrial applications is only now being realised. Microwave heating units are safe, efficient and extremely cost-effective. Microwave energy could revolutionise many industrial processes and cut millions of dollars from manufacturing costs," he said.

The system can process products which can be carried by conveyor or pumped through the core, including liquids, slurries or granular products. It can be adapted to work relatively easily in a controlled atmosphere - pressure, vacuum, or steam.
(Hindu 20 March 1991, 17)

105 Automatic twin-head powder filling machine

Autopack offers an Automatic Twin-Head Powder Filling Machine Model PF-90 for filling powder and granules in containers with filling accuracies upto $\pm 1\%$. Its filling capacity ranges from 5 g to 1 kg and machine output can be up to 80 fills per minute. The machine is provided with no container - no fill attachment. The machine requires a power of 4 kW and its special stirring system ensures good deaeration. It can be linked with seaming, lidding and capping machine in the production line and is suitable for filling tooth powder, talcum powder, dry syrups, coffee, pesticides and other food, pharmaceutical and chemical products in powder form. Automatic powder filling machine with one filling head, Model PF-45, can also be offered.

For further information write to: Autopack Machines Pvt Ltd., 101-C, Poonam Chambers, A Wing, 1st floor, Dr. A B Road, Worli, Bombay 400 018.

(Industrial Products Finder 19(4), 1991, 188)

106 Rotary tin/jar filling machine

Shriram offers a rotary type, semi-automatic tin/jar filling machine for filling containers from 500 g to 5 kg with a filling capacity up to 2,000 kg/hr. It can be used to fill containers with open mouth and narrow mouth for filling vegetable oil, butter oil, fruit pulp, ghee, jam, cream and pastes. Driven by 2 HP common motor it has a mechanical variable speed control for the conveyor and can be used for volumetric and weight fillings. The machine can be changed over from one range to the other in 10 to 12 minutes, and has an electronic no-can, no-fill device for avoiding the wastage of material in the absence of containers. It is manufactured from SS-304 and operating temperatures up to 100°C do not affect the accuracy, reduces the labour cost, easy to maintain and requires 1,000 x 2,000 mm floor space. In-line container steriliser can be provided for the filling machine.

For further information write to: Shriram Temp-X-Changers (India), 991/2/A, GIDC, Opp Makarpura Bus Depot, Vadodara, Gujarat 390 010.

(Industrial Products Finder Annual 1990, 157)

107 Edible bio-packing

The Franz Haas machine line-up now offers machines for the production of bio-packing made from vegetable based raw materials.

The world's largest waffle producer has evolved a versatile packing material as a substitute for paper and plastic. The Haas packing field of use ranges from inserts for chocolate boxes through fruit trays to containers for hamburgers, hitherto mostly of polystyrene. The latest addition is the edible yoghurt container. The container is made of corn or wheat starch, weighs only 5 g and contains hardly any calories for the benefit of conscientious weight watchers. The container's interior is a water-resistant, neutral flavoured and edible lining which corresponds to most of the European food laws. Apart from being fully biodegradable, the new eco-friendly packing can be produced with a minimum of energy and pollution by any food processing firm.

For further information write to: Franz Hass Waffelmaschinen Industrie GmbH, R&D, Haasstrasse, A-2100 Leobendorf, Austria.
(Industrial Products Finder Annual 1990, 441)

108 Metallized film laminates for food packaging

A range of metallized film laminate from a British company is designed to extend the shelf life of perishable foods and beverages, particularly in hot and humid climates. These laminates are a cost effective alternative to aluminium foil structures. The greater flexibility offered by the foils can give rise to easier handling and higher productivity on packaging lines, and their bright metallic appearance and resistance to creasing can enhance pack appearance and maintain a fresh packed look on the shelf. The Campack range of high barrier metallised laminates from Camvac can extend shelf life of oxygen or moisture-sensitive dry food products, such as milk powder, coffee, potato products, snacks and baby foods, to a year or more, so eliminating the need for food preservation additives such as antioxidants which can affect food flavour. Laminates have also been developed for bag-in-box packaging of oxygen sensitive liquids such as wine, beverage syrups, fruit juices and purees. Bags can be produced in capacities ranging from 2 to 1,000 litres, for both retail and bulk packaging.

For further information write to: Camvac Ltd., Burrell Way, Thetford, Norfolk IP24, 3QY, U.K.
(Industrial Products Finder 19(3), 1990, 195)

109 Wrapping machines for biscuits

Khosla Engineers offers three types of machines for wrapping biscuits in EWS (envelope fold) style. Long seal can be made on belly or side (depending on the model). Many useful options are available with these machines. These are: print-registration, no-pocket no-wrap interlock, automatic infeed of biscuits, device for smaller length of inner wrapper and BOPP as inner wrapper. A recently introduced model is specifically designed to use BOPP to wrap naked biscuits in envelope type of folding. A unique feature of this machine is that it makes a folded fin seal on long seam for perfect integrity.

For further information write to: Khosla Engineers, 644, Sector 16-D, Chandigarh 160 015.
(Industrial Products Finder Annual 1990, 283)

110 Powder sieving machines

Ronuk Industries manufactures Turbo and Twin Turbo Finex Powder Sieving Machines designed to provide in-line sifting capacity for sieving powders and use interchangeable mesh basket assemblies. A stainless steel auger feeds the dry material into the mesh basket, where the rotating impellers cause the fine powders to pass through the mesh and eject the oversize. The Twin Turbo has duplicate sieving and driving systems providing a very large throughput within a single body. The machines are suitable for milk food processors, chocolate manufacturers, and pharmaceutical industries.

For further information write to: Ronuk Industries Ltd., LBS Marg, Opp. Shreyas Cinema, Ghatkopar (West), Bombay 400 086.
(Industrial Products Finder 19(5), 1991, 140)

111 Metal bin dryer

The mechanical drying of cereals, pulses, oilseeds and other crops is generally costlier compared to sun-drying because of the high cost of fuel, especially when petroleum products or electricity are used as power sources.

To reduce the cost of drying, a batch bin dryer coupled with an agricultural waste-fuelled furnace has been developed at the Department of Agricultural Processing, at the Tamil Nadu Agricultural University.

The dryer consists of an agricultural waste-fuelled furnace, a blower and a rectangular shaped holding bin. The equipment is provided with rubber wheels for easy transport. The furnace is essentially a heat exchanger consisting mainly of flue and burning chambers, enclosed in two concentric metallic casings.

Fuel used includes coconut husk and shell. The required air temperature, upto 90°C can be obtained by mixing the hot air with the ambient air by means of an adjustable butterfly valve.

For further details, contact: Tamil Nadu Agricultural University, Coimbatore 641 003.
(Economic and Commercial News 21(3), 1991, 13)

112 Paddy dryer

Paddy dryer designed by NRI (Natural Resources Institute) in collaboration with the Sukamandi Research Institute for food crops, Indonesia, developed under ODA research funded project, provides a solar collector in the roof of a simple building.

This gathers the sun's heat and channels the resulting hot air to a fanhouse where a diesel - driven fan passes it evenly through paddy contained in two drying bins. Waste heat produced by the engine allows drying to continue at night, and the dryer can also operate during cloudy weather.

For further information write to: Natural Resources Institute, Central Avenue, Chatham Maritime, Kent ME4 4 TB.
(Documentation Bulletin No.81, 1990, 14-15)

113 Grinding and classifying equipment for spices

Alpine AG, Germany, offers powder processing technology and equipment, for a wide variety of applications. It offers complete systems for any spice and fineness demand, to be used for sauces, soups, cheese, masalas and food products. Developed in close co-operation with spice factories, tailor-made systems are available for cleaning, crushing, fine grinding, cryogenic grinding with LN₂ sieving, sorting, mixing and packing. For example, Alpine Zig Zag Classifiers remove foreign bodies like nails, stones, stalks, leaves, sand and so on, during dry cleaning. Rotoplex granulators can handle leaf-spices, herbs and bark, to be finely cut with minimal dust generation, for production of fine to coarse grained qualities, eg rose hips, hibiscus, ginger, garlic, etc. UP2 fine impact mills are used for granular to ultra-fine ground material qualities. They can be used for any spice, except those with high oil content. Applications include basil, marjoram, turmeric, ginger, chillies, pepper, etc. Alpine Contraplex wide chamber mills CW are proven for fatty and heat sensitive spices. The problematic products handled are aniseed, fennel, cloves, mace, nutmeg, mustard seeds, onions and so on. For gentle mixing of formulae, Trunkated cone mixer KM can be used. Alpine equipment can be imported by actual users/projects under OGL or on AU licence.

For more details write to: Impetus Incorporated, 47A, Vijay Apartments, First Main Road, Shenoy Nagar, Madras 600 030.
(Chemical Products Finder 9(7), 1990, 38)

114 Rice mills

SMS manufactures Rice Mills as per customer's specifications. The mills consist of paddy precleaner comprising rotary scalper, dust aspirator and vibrating destoner; rubber roll sheller to blow the husk away; paddy separator for the complete separation of brown rice from paddy; rice polishers; rice aspirator which grades the rice into three grades of broken rice, and unbroken rice; and a single intake, self-supporting belt type bucket elevator made of MS heavy gauge steel construction. The buckets are self-discharging type and fixed to an endless rubber, cotton or canvas belt of suitable size. The firm offers services for the design, manufacture, erection, and commissioning of rice mills of capacities from 1 to 4 tonnes/hr and provides effective follow up and servicing.

For further information write to: Southern Milling Systems (Madras) Pvt Ltd., 354, First Floor, Triplicane High Road, Madras 600 005.
(Industrial Products Finder 19(5), 1991, 35)

115 Hygiene requirements in food processing met by new pressure transducers

A new family of open-face pressure transducers from Druck has been designed to meet hygiene requirements applied to certain food processing operations. Developed from a Druck open-face pressure transducer widely used in process chemical applications, the PDCR 930-0892 is so designed that no crevices exist at its working face and, accordingly, it is incapable of harbouring substances with the potential of becoming unhygienic. It is available with 13 optional pressure ranges from 350 mbar to 60 bar gauge or absolute, and accuracies to within 0.06% FS. Certain versions of the transducer have the capability to operate at 4-times their rated pressure range, without degradation of performance. The transducer is fully submersible, and highly adaptable to individual user applications. It may be supplied with a variety of electrical connections, including an integral DIN socket, and incorporates a "ISS/IDF fitting at its front-end, as standard; other fittings will become available as further customer requirements are met.

For further information write to: Druck Limited, Fir Tree Lane, Groby, Leicester LE6 0FH, U.K.
(Industrial Products Finder Annual 1990, 263)

116 Conveyor belts made of teflon coated glass fabric

Unnati Industries offers conveyor belts made of Teflon coated glass fabric, marketed under the brandname Unicon. These conveyor belts are non-sticky type, hygienic, have high tensile and tear strength, non-toxic, inert to almost all chemicals, paints and solvents, light weighing, easy to install and maintain, have good electrical insulation, and can withstand temperature range from -200^o to + 250^oC. They are ideal for use in industries such as food, confectionery, cement, garment, tea processing, packaging, and textile. Unicon conveyor belts are also available in open weave material to suit drying process applications. These belts are offered with various types of joints like heat sealed overlap heat sealed butt alligator, splice, and fabric pin splice to suit the operating environments. They are available in thicknesses ranging from 0.15 mm to 0.40 mm, in widths upto 1,400 mm.

For more details write to: Unnati Industries, Ravi Chambers, 3rd floor, Near GPO, Ahmedabad, Gujarat 380 001.
(Chemical Products Finder 9(9), 1991, 72)

17 Sugar cane juicer

BP Engineering has developed a portable three-roller sugar cane juicer which can be operated manually/motorised. The machine is designed to squeeze sugar cane in one input. The rollers made of special steel and gears are available in cast iron or mild steel as per customers' requirements. The unit is supplied complete in all respects.

For further information write to: BP Engineering Works, Bomanji Road, Saharanpur, Uttar Pradesh 247 001.
(Industrial Products Finder Annual 1990, 8)

118 Tomato seed extractor

The machine is intended for extracting tomato seeds without wasting the pulp material. In order to utilise the pulp, the machine components are made of stainless steel. The process of extraction could be done only in batches. Each batch of operation could be continued upto 10 minutes with a loading capacity of 10-15 kg of fruits. The seeds obtained from this unit can be further treated with acids for removing the fuzz and jelly like substances. The machine is operated by a 2 hp electric motor. It has a capacity of 60 kg fruits per hour. The cost of a unit is about Rs. 6,000/-.

For details contact: College of Agricultural Engineering, Tamil Nadu Agricultural University, Coimbatore 641 003.
(Rural Technology September 1990, 28-29)

119 Chillie seed extractor

The dried chilly fruits are cut into small pieces without cell rupture and thereby the seeds are separated from the fruit. This seed extractor is a continuous type which can be easily operated by a farmer. The capacity of this equipment is about 4 q dried fruits/day of 8 h and the cost of seed extraction for 1 q is Rs. 18.85. Scroching and pungent smell to labourers in the conventional practice could be eliminated by using this machine. Its cost including electric motor comes to Rs. 3,000/-.

For details contact: College of Agricultural Engineering, Tamil Nadu Agricultural University, Coimbatore 641 003.
(Rural Technology September 1990, 30-31)

Analysis

120 New method to detect BHC in water

A new method to detect traces of benzene hexachloride (BHC), a potent insecticide that commonly finds its way to tap water, pond and river waters, has been developed.

Researchers from the Department of Chemistry, Ravi Shankar University, Raipur, who devised the method claim it is sensitive, selective and superior to standard methods commonly employed.

In the new procedure, the Raipur scientists extracted BHC from water using activated charcoal which adsorbs the insecticide, leaving behind a clear filtrate free of BHC.

The extracted BHC is dechlorinated to give benzene which is then nitrated, reduced and diazotised. Due to coupling reactions of the resulting diazonium salt solutions, red azo dyes are formed, the absorbance of which can be measured at 530 nanometers to gauge the amount of BHC present.

For dechlorination, the scientists used zinc dust and glacial acetic acid.

According to them, the method is free from interference from other pesticides and pollutants, including both organic and inorganic compounds. The team also attempted to detect traces of BHC from cereals, by first contaminating them with a known amount of BHC and then extracting the insecticide using ether. The rest of the procedure was similar to the earlier one - adsorption on charcoal, dechlorination, nitration to nitrobenzene, reduction to aniline, diazotisation and coupling.

(P.T.I. Science Service 10(4), 1991, 3-4)

Commercial Intelligence

PRODUCTION (Raw Materials)
121 Higher foodgrain production 1989-90

The production of foodgrains during 1989-90 reached an all time high of 170.6 million tonnes compared to 169.92 million tonnes in 1988-89.

Production (in million tonnes) of rice increased from 70.49 in 1988-89 to 74.06 in 1989-90, coarse cereals from 31.47 to 34.31; Production of wheat, however declined from 54.11 to 49.65 and pulses from 13.85 to 12.61 in 1989-90. Oilseeds production from about 1.80 in 1988-89 to 1.675 in 1989-90.

(Economic and Commercial News 21(2), 1991, 12)

122 Production of major oilseeds and extractions and exports of extractions global and India's share, 1989-90

Oilseeds	In million tonnes					
	Production of oilseeds		Production of extractions		Export of extractions	
	<u>Global</u>	<u>India</u>	<u>Global</u>	<u>India</u>	<u>Global</u>	<u>India</u>
Soybean	105.95	1.71	69.80	1.10	26.18	0.93
Cottonseed	30.68	3.80	11.19	0.13	1.11	0.04
Rapeseed	21.60	4.24	12.39	0.95	2.54	0.71
Sunflower seed	21.65	0.49	8.40	0.20	1.96	0.07
Peanut	21.63	8.10	4.76	0.91	0.83	0.42
Copra	4.57	0.40	1.60	0.01	1.05	-
Ricebran	N.A.	-	N.A.	2.15	N.A.	0.63

(SOPA Digest February 1991, 3)

123 Statewise area, production and yield of Pepper in India

(A: Area: '000 ha., P, : Production: '000 tonnes, Y:Yield: Kgs/ha.)

	1985-86			1986-87			1987-88		
	A	P	Y	A	P	Y	A	P	Y
Kerala	121.57	33.12	272	128.87	30.38	236	154.61	48.28	312
Karnataka	2.61	0.67	257	2.68	0.69	257	2.74	0.70	255
Tamil Nadu	0.53	0.20	215	1.25	0.26	208	1.13	0.24	212
Pondicherry	0.01	0.01	1000	0.01	0.01	1000	0.01	0.01	1000
All-India	125.12	34.00	272	132.81	31.34	236	158.49	49.23	311

(Indian Cocoa, Arecanut and Spices Journal 13(1), 1989, 39)

Production (Industrial)

124 Number of units and installed capacity in certain processed foods

(Value in Rs. Lakhs)

Name of the Products	Accounting Units	1975			1985		
		No. of Units	Installed Capacity	No. of Units	Installed Capacity	No. of Units	Installed Capacity
1	2	3	4	5	6		
Biscuit	Tonnes	31	104,448	33	1,47,984		
Confectionery	"	22	35,928	22	35,928		
Bread	"	17	68,204	21	1,21,945		
Soft Drinks	Mill. Bottles	32	1,731	50	2,319		
Malt Extracts	Tonnes	2	4,800	5	13,060		
Vegetable Food	"	-	-	3	10,300		
High Protein Food	"	16	8,951	9	13,600		
Starch	"	9	168,600	11	2,66,580		
Dex Monohydrates	"	2	30,600	6	34,200		
Chocolates	"	5	4,410	6	8,497		
Drinking Chocolates	"	3	1,500	3	1,500		
Cocoa Powder	"	3	642	5	642		
Cheese	"	1	600	2	1,125		

Contd...

Contd.

1	2	3	4	5	6
Cocoa Butter Substitute	-	-	-	1	3,000
Fruit and Vegetable	-	31	97,867	32	1,07,867
Baby Food	-	10	29,578	18	62,478
S.M.P.	-	-	-	22	50,000
W.M.P.	-	-	-	22	-
Condensed Milk	-	6	13,300	6	13,300
Butter	KL	10	12,500	10	12,500
Ghee	Tonnes	19	16,500	19	16,500
Malted Milk Food	-	9	20,418	9	20,988
Ice-Cream	KL	7	9,490	8	10,895
Fish	Tonnes	6	5,500	9	45,500
Meat Products	-	4	1,600	7	-
Macaroni, Noodles	-	-	-	4	34,400
Floor Milling	Th. Tonnes	158	4,993	177	5,288
Breakfast Food	Tonnes	4	6,590	4	6,590
Pearl Barley	-	3	2,550	3	2,550
Corn Flakes	-	-	-	1	-
Cat Flakes	-	-	-	3	3,223
Snack Food	-	-	-	-	-

(NAFED Marketing Review 20(11-12), 1990, 15)

Export

125 Country-wise export of Pepper from India

(Q: Quantity in tonnes, V: Value in '000 Rupees)

Country	1984-85		1985-86		1986-87	
	Q	V	Q	V	Q	V
1. U.S.S.R.	14793	335911	9907	449226	9644	525101
2. U.S.A.	1144	31799	13999	645455	15322	835610
3. Canada	523	12503	991	44912	856	38804
4. Italy	985	23459	1157	52676	1428	80356
5. Czechoslovakia	838	20825	946	40490	899	55651
6. Yugoslavia	721	20203	761	34308	541	30987
7. Poland	844	20040	1350	57948	460	31583
8. Rumania	500	11999	500	23200	150	9974
9. Hungary	810	18827	-	-	505	26751
10. Saudi Arabia	32	551	434	19627	376	19120
Total	25296	595885	40184	1808748	37465	2011037

(Indian, Cocoa, Arecanut and Spices Journal 13(1), 1989, 41)

126 Export of oilseeds, oilmeals and fats during 1989-90 and 1988-89

(Qty. in M.T., F.O.B. in Rs. Crores, UV = Unit Value in Rs./M. tonne)

1989-90 1988-89

Items	Qty.	FOB	UV	Qty	FOB	UV
I. Extractions						
a) Soybean Extractions	9,33,233	361.23	3,871	7,48,000	296.00	3,957
b) Groundnut Extractions	4,19,755	83.71	1,994	2,60,529	50.15	1,924
c) Cottonseed Extractions	36,637	7.12	1,943	15,302	3.01	1,967
d) Rice Bran Extractions	6,34,543	65.34	1,028	3,96,436	36.68	925
e) Rapeseed Extractions	7,10,597	90.68	1,276	1,24,145	17.66	1,422
f) Sunflowerseed Extractions	65,267	9.40	1,439	75,886	9.83	1,295
g) Salseed Extractions	74,547	6.06	813	21,517	1.75	804
h) Other Extractions	24,253	4.79	1,975	44,468	7.43	1,670
Sub Total (I)	28,98,852	628.33	-	16,86,283	422.49	-
II. Oilseeds						
a) Niger Seed	10,608	9.05	8,531	13,441	13.90	10,326
b) Sesame Seed	1,38,530	178.10	12,856	18,885	19.90	10,542
c) HPS Groundnut	24,791	26.83	10,822	36,985	34.80	9,395
d) Safflower Seed	-	-	-	-	-	-
Sub Total (II)	1,73,929	213.98	-	69,311	68.60	-
III. Minor Oils						
	5,180	11.88	-	1,645	3.91	-
Grand Total	30,77,961	854.19	-	17,57,239	495.00	-

(SOPA Digest February 1991, 4)

127 Sugar to be exported

The Government has asked STC to export directly or in association with sugar industry 2,00,000 tonnes of sugar during the current year. International prices of sugar are generally lower than the f.o.b. cost of Indian sugar and exports of sugar other than those against high priced preferential quotas of USA and EEC are eligible for appropriate Cash Compensatory Support from the Government.

Current estimates place sugar production for the current year at approximately 11 million tonnes. Exports of 2,00,000 metric tonnes of sugar is not likely to affect the interests of domestic consumers in terms of price. This information was given in the Lok Sabha by Mr. Shantilal P. Patel, Deputy Minister of Commerce, on January 4, 1991. (Economic and Commercial News 21(3), 1991, 9)

128 Cashew exports up

The earnings from the export of cashew kernels for the period January to August 1990 has appreciated by 15 per cent to register a level of Rs. 2636.7 million as compared to Rs. 2287.7 million in the corresponding period of the previous year. The total export quantum aggregated 31193 tonnes an increase of 11 per cent over the level achieved during January to August 1989.

The unit price average was also higher at Rs. 84.53 per kg as compared to Rs. 81.05 per kg last year, indicating a rise of 4.3 per cent.

According to the Cashew Export Promotion Council, nearly 37 per cent of the export was to Holland. This was, in fact, 18 per cent more than the export to that country during the corresponding period to the previous year.

Soviet Union accounted for an offtake of 28 per cent followed by USA and Japan, with eight per cent each, and Czechoslovakia four per cent.

Exports during August 1990 aggregated 3897 tonnes worth Rs. 354.8 million as compared to 4863 tonnes worth Rs. 400.7 million during August 1989, indicating a fall of 20 per cent in quantity and 11 per cent in value.

According to CEPC, during August, an amount of 102 tonnes of raw cashew nuts worth Rs. 142.1 million was imported through the Cochin Port. The total exports during January-August 1990 was of the order of 58324 tonnes worth Rs. 841.3 million. Imports in the same period in the previous year was to the tune of 21524 tonnes valued at Rs. 296.6 million. Nearly half the quantity purchased was from Vietnam.

A total of 668 tonnes of cashew shell liquid worth Rs. 4.81 million was exported in August as compared to 142 tonnes worth Rs. 1.37 million approximately in the corresponding period of 1989. The cumulative total exports during January to August 1990 for cashew shell liquid amounted to 2381 tonnes worth Rs. 17.9 million. This indicated a 50 per cent rise in quantity and 25 per cent increase in value.

(Economic and Commercial News 20(50), 1990, 5)

129 Exports of cashew in OGL

The Government has decided to put the export of cashew kernels, including roasted/salted, in consumer packs of one kg or less, under Open General Licence No.3.

This is subject to registration of contracts with the Cashew Export Promotion Council, Cochin.

According to an official release issued in New Delhi recently, requests based on pre-control commitment will be considered by the

export licensing committee in the office of Chief Controller of Imports and Exports as per procedures stipulated in the 1990-93 Policy.
(Economic and Commercial News 20(50), 1990, 5)

130 Export limits of wheat, non-Basmati rice raised

The Government has decided to enhance the ceilings for export to one million tonnes each of wheat and non-basmati rice during the current year. This has been done to earn foreign exchange for providing support to the balance of payments problem.

Successive record production of cereals and higher levels of procurement have facilitated this action.

The government has also widened the definition of the articles allowed for export under "food" to include agriculture and agriculture based products. Under the new definition, among other things, the entries relating to "food" will now be deleted. Similarly, in another change it has included poultry and animal products, in the category of existing product group "S".

In other words, the new product group will now comprise all types of canned meat and poultry meat. In addition, it will cover all varieties of fresh chilled and frozen meat, poultry meat, animal casings, live chicks, hatching eggs, table eggs and essence of chicken, in Appendix 17 of the export-import policy. The import replenishment entitlement percentage in the case of all types of canned meat and poultry meat would now be 20 per cent.

The Ministry of Commerce has also permitted the export of jaggery, as per prescribed procedure in Import and Export Policy 1990-93 Volume II.

A ceiling of 5000 metric tonnes has been released and has been placed at the disposal of Agricultural and Processed Food Products Export Development Authority.
(Economic and Commercial News 21(12), 1991, 7-8)

131 Spices export earnings dip

Spices export earnings have come down by Rs. 22.37 crores for the nine-month period ended January 1991 when compared with the corresponding period last year. According to figures released by the Spices Board both lower prices and volume have contributed to the reduced earnings.

In the case of pepper - by far the largest export earner - despite an appreciable increase in volume of exports, earnings have not kept pace. Exports fetched only Rs. 7762.10 lakhs as against Rs. 10,117.5 lakhs last year even as an additional 1776 tonnes have been shipped.

The biggest gain has been registered in small cardamom. An increase of just 50 tonnes has brought in Rs. 325 lakhs more. Large cardamom exports went up from 502 tonnes to 685 tonnes bringing in an additional Rs. 100 lakhs.

Chillies export more than doubled volume-wise, from 7958 tonnes to 15950 tonnes. Earnings, however, did not increase proportionately going up from Rs. 1673 lakhs to Rs. 1817 lakhs.

Turmeric, another major export product, reversed the trend. Earnings hovering around the Rs. 1100 mark held steady although volume-wise there has been a decline from 12300 tonnes to 10450 tonnes.

From the export of spice oils and oleoresins the country earned Rs.2222 lakhs as against Rs. 1817 lakhs in the previous year while there has been an increase of about 55 tonnes by volume.
(Financial Express 4 April 1991, 12)

132 5-pronged strategy to boost marine exports

A five-pronged strategy is being launched to boost marine exports so as to achieve substantial increase in foreign exchange earnings during the Eighth Plan.

By stepping up production and productivity from both deep sea aquaculture sectors, India has the potential to boost marine exports to a level of around Rs. 5,400 crores, it is pointed out. Marine exports during 1989-90 amounted to 1,10,873 tonnes valued at Rs. 635 crores.

Induction of new technology and value addition, modernisation of processing facilities, quality upgradation and reduction in waste and aggressive market-promotion measures are part of the strategy.

The Indian Exclusive Economic Zone (EEZ) is estimated to have a resource potential of 4.5 million tonnes, whereas the level of exploitation is only one-third of the potential yield.

Scientists have identified 10 fishery resources groups in the Indian EEZ that could be commercially exploited. However, taking into consideration the demand in the international markets, the country proposes to concentrate its efforts to exploit four of these groups namely, tuna, cephalopods, deep sea lobster and sea prawn and other fishes.

The Government has recently initiated a series of policy measures which aim at liberalising the existing policy framework with a view to enhancing India's foreign exchange earnings from marine sector and facilitating exploitation of the unexploited resources.

The policy aims at attracting investments, encouraging foreign technical and financial collaborations, provision of adequate finance

and infrastructural facilities and introducing simplified procedures and rules.

Under the new deep sea policy, test fishing has been permitted to facilitate pre-investment study for assessing commercial viability of specific fishing operations in Indian EEZ and vessels on long lease have been permitted to operate into the Indian EEZ. Debt-equity norms for acquisition of vessels enhanced to that of 6:1 and producer exporter to get diesel oil at international prices.

Further, the revised joint venture policy envisages relaxation of 40 per cent foreign equity norm on case by case basis; treating cost of vessels as part of equity of foreign collaborator; transportation of the catch to ports abroad is permitted and a single window clearance to all proposals on deep sea fishing.

As a part of measures to boost export of marine products, import duty on prawn feed has been reduced to 25 per cent, import duty on a number of sea food processing machinery have been reduced to nominal rates; prawn feed, fish meal and import of fish/shrimp have been placed under advanced licensing and 26 seafood processing machines have been placed under OGL.

India is a marginal player in the global seafood trade with a share of 1.12 per cent in quantity terms (1,10,873 tonnes) and 1.19 per cent in value terms (Rd. 635 crores or \$ 381 million). (Financial Express 14 January 1991, 1)

133 Shrimps export facing threat

Indian shrimps export, already tottering in the face of increasing competition in traditional markets like Japan, is facing the threat of blacklisting in the US.

Following, detection of "microfilth", the US Food and Drug Administration (FDA) had kept frozen shrimps import from India "under alert" a few months ago. But, strangely enough, the Government here has not so far made any worthwhile efforts to ease the situation.

This is not the first time that Indian shrimp finds itself in a tight spot in the US. Nearly a decade ago, shrimp import from India was totally banned in that country following a "salmonella scare". It took a long time before FDA could be convinced of an improvement in quality and make it lift the ban.

It is said that the exporters have been rather casual in their approach to the US market which has yet to emerge as a major destination for Indian shrimps. Of a total of 13,802 tonnes of marine products exported to the US in 1989-90, shrimps accounted for a mere 1,100 tonnes. In terms of earnings, shrimps' share was Rs. 11.01 crores in a total of Rs.78.33 crores.

Of late, however, much importance is being attached to the US market. For one, there has been a steady drift in India's share in

the traditional market of Japan owing to stiff competition from countries like Thailand, Indonesia and Malaysia. The focus is, therefore, slowly turning on to the vast US market with tremendous untapped potential.

According to sources, the stiff US posture is the result of lax preshipment inspection arrangements back home. It is pointed out that the Government had assigned the Export Inspection Agency for quality testing of shrimps for export. EIA, on its part, has been in the process of entering into a memorandum of understanding with FDA covering export of all food items to that country.

But, the Government has lately allowed exporters with a turnover of above Rs. 1.5 crores to do selftesting without having to go to EIA. This decision is feared to further escalate the problem faced in the US.

(Financial Express 19 December 1990, 1)

134 Jaggery exports against 100 pc LCs allowed

The agricultural and processed food products' export development authority (APEDA), will allow the export of jaggery against 100 per cent irrevocable letters of credit, opened and established by the foreign buyers in favour of the Indian exporters.

A clarification on this issue was issued by the chief controller of imports and exports on January 7.

(The Economic Times 15 January 1991, 9)

135 Coffee exports increase

Coffee exports during 1989-90 totalled 1,34,076 tonnes, as compared to 98,266 tonnes in the previous year, Deputy Commerce Minister Mr. S.P. Patel informed the Lok Sabha.

(The Times of India 31 December 1990, 14)

136 Tata steel to export food products

A leading steel company has diversified its export basket to include even food products to meet the import costs of raw materials and equipments for its ongoing modernisation drive, reports PTI.

While engineering goods and raw materials still account for the bulk of the total exports of Tata Steel valued at Rs. 147 crore in 1989-90, turn over in black pepper, coffee and shrimps aggregated Rs. 15 crore.

According to representatives of the company, it has achieved a whopping 783 per cent increase in exports in the last five years, making the company one of the largest export houses in the country.

At the ongoing engineering trade fair in the capital, Tata Steel has focused exclusively on what it calls its "decade of exports" (1990 - 2000).
(The Economic Times 13 February 1991, 3)

137 Few takers for milk products abroad

The non-pharma industry has lost a golden opportunity to export milk products and allied items of consumption. The Ministry of Commerce had granted permission for the export of 1000 tonnes of such products, in the month of November. However with the due date, for the permission to expire, fast approaching (March 31) not a single tonne of milk product has gone out of the country. In terms of value the loss works out to roughly Rs. five crores.

According to sources in the industry, permission for the same was sought almost two years ago and was received only in November 1990. However the industry was not able to cash in on the chance mainly because there was a dearth of orders, the period between November 90 to January 91, being a turbulent one, thanks to the Gulf war and the widespread repercussions it had globally.

Glaxo India Ltd for example had been granted permission to export two of its products namely 'Bonnymix' and 'Farex'. However, Farex was not to be marketed under the same brand name. It is to be called 'Weanex'. At the same time another of its major products, Complan was denied permission to be exported.

This, according to sources in the industry is probably because Complan contains more than 50 per cent milk and the Government has certain hesitations about allowing the export of such items.

But the industry is treading cautiously, the second time. It does not want a situation again, where there is permission but no orders. "We intend to talk to our customers and fix up things before we apply for an extension afresh. It will take time, say around two to three months. In any case we do not expect the volumes to be very large", says source in the industry.
(Financial Express 13 March 1991, 4)

Import

138 Almonds import ban

The Government has decided to ban the import of almonds against additional licences.

According to a public notice issued here, the additional licences issued from April 1, 1991 shall not be valid for import of almonds. (Financial Express 3 April 1991, 1)

Trade Information

139 Tech Information Centre in Delhi

The Directorate General of Technical Development (DGTD) is establishing a technology information centre in Delhi to cater to the needs of industry. It has already set up a few advisory groups on perspective technology planning. The technology centre will collect information on technologies, including sources of availability of commercially proven technologies. It will also provide information on the new trends in technologies around the world. The advisory groups have assessed the existing technologies in terms of quality, design, manufacturing techniques and the status of contemporary technology in the international arena. The DGTD has also commissioned studies to help Indian industry to undertake modernisation and expansion, so that Indian industry can keep pace with global developments. (Industrial Products Finder Annual 1990, 213)

140 'Tetra-pak' drinks lose flavour

A year ago, they seemed set to take the fizz off the soft drink market. - Today, except for the market leader "Frooti", all tetra packaged fruit-based drinks, are either floundering or off the shelves.

Two products that entered the market, hot on the heels of the "Frooti" success, seemed set to provide a formidable challenge to Lipton Ltd, through "Tree Top" and Voltas through "Volfruit".

The marketing blitz launched by the two big guns, created enough of a splash to for marketing experts to give them a fair chance, especially because of their formidable distribution chains and marketing savvy.

A number of would be franchises also rushed to tie-up with Tetra Pak of Sweden to set up at least a couple of lines to manufacture the new wonder drink. However, no amount of market survey could save the product from the high price of the packaging.

Lipton's Tree Top brand is on the way out of the market, unless the company comes up with a solution to salvage the brand which is quite successful in England.

The company, which hired two manufacturing lines from Noble Soya House Ltd., soon after the "Great Shake" debacle, has been tardy in honouring its commitments to the Godrej company. While Lipton is not manufacturing to full capacity, market watchers say that the product continues to limp along and may be around for another season. However the fact is that "Tree Top" seems in danger of falling off its perch.

On the other hand, Noble Soya, which is now financially much stronger following the merger with Veg oils Ltd, is now negotiating a major deal with Lipton to take over the franchise and market the product themselves.

According to sources, Noble Soya will enjoy a small advantage since it could cut the cost of manufacture. Success will however depend on the quantum of franchise fees.

As for Voltas, Mr. Chatterjee from the sales division says, "we have phased out the product, we will not be in the market this season". Basically, he says, the value of the product was disproportionately low as compared to the packaging, making the production and distribution costs prohibitively high.

At a rough estimate, he said, the ratio of cost of the product to packaging was 40:60. There was a further squeeze on margins since the franchise had also to be paid.

As for Noble Soya, while it is in the process of negotiating with Lipton, the decision seems rather shaky. Not only has it burnt its fingers with "Great Shake", the first soya milk based beverage in the country, but its recently launched "Tomato puree" also sold in tetra packs, has not met with much success during the Bombay launch.

Another Tetra brik - "Mr. Real" the milkshake launched by Amul has also disappeared from shop freezers, at least it is no longer publicized. According to sources, Amul obviously finds it more lucrative to use the milk in dairy products rather than low profit milkshakes.

However the soft drink supremo - Parle products seems to find it smooth sailing - at least the market leader "Frooti". Appy, has not really caught on, but is doing well enough to be pushed with the mango product. Sources point out that Parle enjoys a tremendous advantage because of the synergy involved, it enjoys an edge by being able to cut costs in marketing and distribution as well as in the manufacture itself.

(The Economic Times 4 January 1991, 11)

141 Procurement price for cashews fixed

The Kerala Government has issued a notification fixing the procurement price of raw cashewnuts ranging from Rs. 13 to Rs. 14.50 a kg. under the monopoly procurement programme in various regions. (Financial Express 31 December 1990, 2)

142 Vanaspati units plea for increased use of mustard oil

The vanaspati industry has made a plea for increased use of mustard oil in vanaspati manufacture in view of the anticipated bumper production of this oilseed this year. Such a measure would help ensure remunerative prices to rapeseed-mustard growers to sustain their interest in raising output further, it has argued.

The industry feels that vanaspati can be prepared gainfully by using an admixture of mustard oil and non-traditional oils, including mahua oil, watermelon seed oil, etc. The limit of mustard oil use could range from 10 to 30 per cent depending on the overall edible oil scenario.

According to the Indian Vanaspati Producers' Association (AVPA), proper market support can help boost the production of rapeseed-mustard substantially in a short time. Indeed, its output has already gone up rapidly in the past few years, rising from 26 lakh tonnes in 1986-87 to nearly 44 lakh tonnes in 1988-89. It is expected to touch 50 lakh tonnes in 1990-91.

There is a potential to increase area under rapeseed-mustard group of crops to over 50 lakh hectares from the present around 40 lakh hectares. This would yield about 14 to 15 lakh tonnes of oil annually. These crops are grown extensively in Rajasthan, UP and Haryana.

The direct consumption of this oil is limited to seven to eight lakh tonnes a year. The surplus output would be available to the processing industry, notably the vanaspati industry. (The Times of India 2 January 1991, 16)

143 Curbs on vanaspati expansion eased

The Union Government is reportedly allowing capacity expansion by private sector vanaspati units more liberally. The Government has recently cleared five proposals for capacity expansion in the private sector. The five proposals are those of Oswal Vanaspati and Oil Mills, Ludhiana, Agarwal Industries, Hyderabad, Haryana Vanaspati and Mills, Ludhiana, Agarwal Industries, Hyderabad, Haryana Vanaspati and General Mills, Swarup Vegetable Production, Uttar Pradesh and Deepak Vegetable Oil India Pvt Ltd., Gujarat. According to the Union Ministry of Food and Civil Supplies, the proposals for expansion of

existing units will be considered irrespective of which sector the units belong to. Expansion may be allowed from the minimum economic size of 25 tonne per day to 50 tonne per day depending on the location.
(Industrial Products Finder Annual 1990, 225)

144 Fruit processing - Bleak prospects for Maharashtra units

The recent announcement of Maharashtra Government on setting up two fruit processing units in the coming years, though laudable, does not seem to fit in with ground realities.

But the status of fruit processing industry in the State indicates a bleak future for the two factories.

The present condition of NOGA (National Orange Growers Association), a fruit processing factory run by the State Government, itself should be a big deterrent for any step towards this direction.

NOGA was taken over by the State Government in 1972 from the co-operative sector, which was running the institution, after the company went into liquidation. But even after changing hands, the factory's condition did not improve as it had been consistently showing losses except for a single year in 1982-83.

The main reason for the company's dismal performance is the rising cost of inputs vis-a-vis raw materials required for fruit processing and the back-breaking taxes which has placed the industry's products out of reach of the consumers.

The main grouse of NOGA, according to a report submitted to the State Government, is the extraordinary amount of taxes levied on the products. NOGA attracts 10.50 per cent octroi and 15.75 per cent tax on all its cold drink products, which the small-scale industry does not bear.

In all, a NOGA product has to pay 30 per cent taxes in various forms. Apart from this, it spends 30 per cent of its total income on packaging and 15 per cent on overhead cost.

Besides the single example of NOGA in the State, the fruit processing industry in the country itself is placed in a delicate position, almost to the brink of closure.
(Financial Express 12 January 1991, 5)

145 Processed foods - FICCI for review of tax structure

The Federation of Indian Chambers of Commerce and Industry (FICCI) has suggested rationalisation and restructuring of the indirect taxes on the processed foods to stabilise their prices and make them affordable to the common man.

At a time when the food processing sector is at a nascent stage and capacity utilisation is as low as 40 per cent FICCI feels that the Government should take steps to lighten the incidence of indirect taxes on processed food by imposing a uniform rate of duty at the rate of five per cent irrespective of classification under the central excise tariff.

FICCI pointed out that at present, the number of food products were subjected to Central excise duty varying between 10 per cent and 30 per cent and special excise duty as applicable.

Another major handicap which has come in the way of the growth of processed food sector was the high cost of packaging which approximately adds to 40 per cent of the cost of the final product.

FICCI feels that this was mainly due to cumulative incidence of indirect taxes like customs duty, Central excise, sales tax and octroi on packaging materials.

The federation is organising a workshop on "impact of indirect taxes on food processing industry" here on January 9 to discuss the incidence of various levies on this sector and also to make suggestions for rationalising and restructuring them to ensure smooth and organised growth of this sector. The Deputy Finance Minister, Mr. Digvijay Singh, will inaugurate the workshop.

The background paper prepared by FICCI for the workshop maintains that for select group of processed foods, the price increase between 1980 and 1989 ranged between 62 and 135 per cent. The price of mango juice went up by 135 per cent in 1989 compared to 1980. The similar figure for green peas was 100 per cent, tomato juice 101 per cent and pineapple slices 84 per cent.

FICCI said taxes were responsible for increase of apple juice price to the extent of 70.82 per cent. The same figures for mango pulp (alphanso), green peas and pineapple were 48.38 per cent, 67.70 per cent and 65.80 per cent respectively.

The federation has called for slashing down of ad valorem duties on coffee by 15 per cent, health products by 10 per cent, cocoa and cocoa products by 10 per cent, glass and bottles from 20 to 40 per cent and tin cans by 10 per cent.

FICCI suggested that the machinery needed for the food processing industry should be allowed to be imported at the concessional rate of 40 per cent ad valorem.

(Financial Express 9 January 1991, 10)

146 Alcohol for industries at Government fixed prices

The Gujarat High Court has directed all distilleries in the state to supply industrial alcohol to consuming units at government-fixed prices. Giving its interim injunction on a special civil application the court ordered: "It is hereby accordingly ordered that you, your

servants and agents be and are hereby directed to supply alcohol to the members of the petitioner association at the price fixed by the government"... The special civil application will be heard on November 14.

Distilleries have been directed to sell alcohol only at the price determined by director of prohibition and excise. Prices have been fixed separately for individual distilleries on the basis of their size, type of fuel consumed, effluent treatment facilities and the like. The prices approximate to the BICP-fixed price.

Industry sources in Gujarat feel the government fixed prices are quite viable and will go a long way in encouraging alcohol-based industries. Some inefficient distilleries will of course be hurt. The court order is expected to goad them to instal modern effluent treatment plants which will actually reduce cost of alcohol production. This because almost 80 per cent of steam requirement can be generated by burning effluent gases.
(Chemical Weekly 36(9), 1991, 65)

147 Potable alcohol: Ban on fresh ILs

The Union Government has decided to put a ban on fresh applications for the grant of industrial licences for the manufacture of potable alcohol based on non-molasses raw materials.

Through a press note issued here on Friday, the administrative department of Industrial Development (ID) in the Industry Ministry said that there was no further scope for entertaining more applications in this regard and the freeze would come into effect on the expiry of 30 days from February 15, 1991.

The freeze on fresh applications is now being applied as a large number of industrial licence applications have already been received.
(Financial Express 16 February 1991, 1)

148 Fresh capacity for beer not allowed

The Union government has decided not to accept any fresh application for the grant of industrial licence for the manufacture of beer after April one, according to an official press release.

Earlier by a press note no.4 (1989 series) the government had decided to permit creation of fresh capacity for the manufacture of beer. A large number of applications have already been received for the grant of an industrial licence to manufacture beer. The government now feels there is no further scope for entertaining more applications for manufacturing beer, adds the press note.
(Economic Times 13 March 1991, 1)

149 Excise duty cut on glass containers sought

To encourage the use of glass containers in packaging, the Associated Chambers of Commerce and Industry (ASSOCHAM) has mooted reduction of excise duty on them from the existing 42 per cent ad valorem to 15 per cent.

In a letter to the Chairman of the Central Board of Excise and Customs (CBEC), the chamber has pointed out that the containers are totally indigenous with no imported inputs in them.

It has also suggested that the product if made internationally competitive could be exported to large extent.

For this, the domestic demand must be stimulated by reducing the excise duty which will encourage the industry to modernise their plants and expand production to take advantage of the economies of scale.

(Financial Express 31 March 1991, 3)

150 Spices: Kerala to set up information centres

The Kerala Government has plans to set up technology information centres to study various aspects of spices and to make value-added products, the State Agriculture Minister, Mr. V.V.Raghavan, said in Thiruvananthapuram on Tuesday.

A committee to go into this had been constituted jointly by the Spices Board, the State Government and the Regional Research Laboratory.

(Financial Express 3 April 1991, 12)

151 New cocoa shippers manual

The International Trade Centre UNCTAD/GATT has published a new handbook for exporters of cocoa beans which gives in depth the steps in processing an export order. The publication titled "Cocoa: A Shipper's Manual", deals specifically with physical cocoa beans contracts. It explains the terms and procedures to be followed in executing such contracts, including their administration, documentation, insurance, involving payment and supervision. Also covered are quality requirements and arbitration, as well as post-harvest handling, storage, shipment and fumigation of cocoa beans. The handbook is directed at new exporters of cocoa beans as well as exporters requiring more information on contractual arrangements for such sales.

The 380-page manual is one of the series of ITC's "Cocoa: A Trader's Guide", published in 1987.
(Journal of Scientific and Industrial Research 50(3), 1991, 264)

152 Japan's Biomarket

According to the results of a survey conducted by the Ministry of Agriculture, Forestry and Fisheries (MAFF), Japan's market for biotechnology-based products tripled from 100 billion yen in 1989 to 295 billion yen in 1990.

Drugs, detergents and equipment accounted for around 93% or 275 billion yen of the 1990 total. Nonprocessed food products accounted for some 5% or 10.4 billion yen, and tissue-cultured seedlings for 2% or 6 billion yen, totaling 7% for agriculture-related products. The market for industrially processed food products grew with oligosaccharides accounting for 7 billion yen, Stevia sweeteners for 1.5 billion yen, and biotechnologically-produced wines for 5 billion yen.

(COMLINE News Service February 1991, 1)

Food Regulation, Quality Control & Hygiene

153 Prevention of Food Adulteration (Sixth Amendment) Rules 1990

G.S.R. 732 (E) - Whereas a draft of certain rules further to amend the Prevention of Food Adulteration Rules, 1955 were published as required by sub-section (1) of section 23 of the Prevention of Food Adulteration Act 1954 (37 of 1954) with the Notification of the Government of India in the Ministry of Health and Family Welfare (Department of Health) No.G.S.R. 3(E) dated the 2nd January, 1990 in the Gazette of India Extraordinary, Part II Section 3, Sub-section (i), dated the 2nd January, 1990 at pages 3 to 5, inviting objections and suggestions from all persons likely to be affected thereby before the expiry of a period of sixty days from the date of publication of the Notification in the Official Gazette;

And whereas, the copies of the Gazette Notification were made available to the public on 5-2-1990;

And whereas the objections and suggestions received from the public on the said draft rules have been considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) of section 23 of the said Act, the Central Government after consultation with the Central Committee for Food Standards hereby makes the following rules further to amend the Prevention of Food Adulteration Rules, 1955, namely:-

RULES

1. (1) These rules may be called the Prevention of Food Adulteration (Sixth Amendment) Rules, 1990.

(2) They shall come into force from the date of their publication in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955 after rule 44-AA, the following rule shall be inserted namely: -

"44-AAA No person shall sell or offer or expose for sale or have in his premises for the purpose of sale under any description, food articles which have been coated with mineral oil, except where the addition of mineral oil is permitted in accordance with the standards laid down in Appendix 'R'.

(The Gazette of India, Part II - Section 3-Sub-section(i) No,356, 1990)

154 Prevention of Food Adulteration (8th Amendment) Rules, 1990

G.S.R. 764(E) - Whereas a draft of certain rules further to amend the Prevention of Food Adulteration Rules, 1955 was published as required by sub-section (i) of section 23 of the Prevention of Food Adulteration Act, 1954 (37 of 1954) with the notification of the Government of India in the Ministry of Health and Family Welfare (Department of Health), No.G.S.R. No.817(E), dated the 6th September, 1989, inviting objections and suggestions from all persons likely to be affected thereby on or before the expiry of a period of sixty days from the date on which the copies of the Gazette in which the said notification was published were made available to the public, and whereas the copies of the said Gazette were made available to the public on the 1989.

And whereas the objections and suggestions received from the public on the said draft rules have been considered by Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) of section 23 of the said Act, the Central Govt. after consultation with the Central Committee for Food Standards, hereby makes the following rules further to amend the Prevention of Food Adulteration Rules, 1955, namely:-

RULES

1. (1) These rules may be called the Prevention of Food Adulteration (8th Amendment) Rules, 1990.

(2) They shall come into force after three months from the date of their publication in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955, (1) in rule 20, for the word "Khoa" wherever it occurs the words "Khoa or Khoa based and Paneer based sweets, such as Kalakand and Burfi, Chutney and prepared foods" be substituted.

(2) In Appendix 'B' (i) in item A.11.02.14, in the second para, the words and figures "when the net quantity exceed 510 gms", shall be omitted.

(ii) in item A.11.02.16, the second para, the words and figures "when the net quantity exceeds 510 gms", shall be omitted.
(The Gazette of India, Part II - Section 3-Sub-section(i), No.383, 1990)

155 Refined green tea extract as health food

Tokyo-based Nippon Mining Co., Ltd (5712) has applied to the Ministry of Health and Welfare (MHW) for approval to manufacture and market 'Camellia 50EX', a refined green tea extract, as a health food.

Camellia 50EX, reportedly effective in preventing hypertension, contains the natural lipid oxidant catechin as well as vitamins, organic salts, and polysaccharides. Nippon Mining will target the extract at processed food manufactures as an additive for health foods and beverages.

(COMLINE News Service February 1991, 1)

156 New and revised Indian Food Standards

IS 11674 : 1986	Method for determination of residual solvent in oilseed flour and meals by modified Pensky-Martens closed tester. Gr 2
IS 12792 : 1989	Agricultural produce milling machinery - Mini rice mill. Gr 2
IS 12895 : 1990	Alga spirulina, food grade. Gr 2
IS 12898 : 1989	Dairy products - yoghurt. Gr 2
IS 12899 : 1989	Dairy products - yoghurt, enumeration of specific lactic acid bacteria-method of test. Gr 1
IS 12923 : 1990	Cane gur (jaggery). Gr 1
IS 12924 : 1990	Bura. Gr 1

The Standards are available with the Bureau of Indian Standards, Manak Bhavan, 9, Bahadur Shah Zafar Marg, New Delhi 110 002)
(Standards India, October, November 1990)

HYGIENE

157 Carrot reduce cardio-vascular disease

A new study in USA has shown that beta-carotene, a precursor of Vit-A and which gives orange colour to carrot may reduce the risk of heart attacks, strokes and sudden death from coronary artery diseases.

This study provides the first evidence in humans that beta carotene, the primary building block of Vit-A may be useful in treating heart and blood vessel disease, reports Dr. Michael Gaziano, cardiologist at Boston's Hospital. The study looked at 333 male doctors who had evidence of coronary artery disease but no history of heart attacks.

(Chemical Weekly 36(20), 1991, 107)

158 Anti-cancer properties identified

A variety of plant products, including spices and leafy vegetables have been identified to possess significant anti-cancer activity by researchers from the Cancer Institute, Adyar, Madras. The anti-carcinogenic products include cumin seeds, poppy seeds, asafoetida, turmeric, pepper, drumstick leaves, leaves of ocimum (tulsi) and Solanum Nigrum and flowers of azadirachta (neem).

Most cancer-causing agents are not active by themselves and need to be activated before they produce biological effects. Hence, chemicals that prevent their activation are important in preventing cancer. The products given above increase the carcinogen-detoxifying enzyme glutathione-S-transferase (GST) by 78 per cent in stomach, liver and oesophagus thus serving as protective agents against cancer. (Chemical Weekly 36(19), 1991, 108)

159 'Jamun' fruit controls diabetes

Recent research shows that consuming "jamun" regularly can reduce blood glucose levels in the body to a great extent, thus helping in better control of diabetes, Dr.S.M.Kelkar and his co-workers from Bhabha Atomic Research Centre at Bombay, according to a paper presented at India-USA symposium on endocrinology, metabolism and diabetes held here, found that fruits and seeds of the jamun and bark of banyan tree have some carbohydrates and amino acids which are anti-

diabetic in nature. Tests on rats show that oral administration of partially purified extracts of these fruits reduce blood glucose by about 76 per cent, pulp by about 68 per cent and the extract of banyan bark by about 62 per cent.
(Deccan Herald 3 January 1991, 10)

160 Red meat alert

If you eat pork, lamb or beef daily, you are two-and-a-half times as likely to develop colon cancer as someone who eats these meats less than once a month. So concludes a prospective study of nearly 89,000 women in the U.S. published in the current issue of the New England Journal of Medicine (vol 323, p. 1664).

A team at Harvard Medical School and the Brigham and Women's Hospital in Boston sent dietary questionnaires to the women, all between the ages of 34 and 59, from 1980 to 1986. During that time, 150 women developed cancer of the colon.

Two fats that are abundant in red meat, saturated and monounsaturated, were both positively linked with colon cancer. The women who ate most animal fat faced almost double the risk of those who ate least. And those who ate most fat also tended to eat little fibre, which further increased the risk. Dairy fats were not linked to colon cancer.

No one knows why red meat increases the risk, but research in animals shows that bile acids, secreted to help digest fatty meat, promote tumours.

(New Scientist No.1748-9, December 1990, 9)

161 Pesticide poisoning rate high

At least 20 people out of 100,000 die of pesticide poisoning every year in developing countries says an eminent environmental technology expert.

The most serious cases of pesticide poisoning have resulted from consumption of contaminated foodstuffs or treated cereal seeds, according to Prof. Gordon R. Conway, a Ford Foundation representative based here.

People in developing countries consuming locally marketed food, were exposed to the biggest risk, he said.

"Leafy vegetables are often sprayed twice a week and may come to market with a high degree of contamination, especially during the dry season", Prof Conway said in his first foundation day lecture of the Forum of Agro Rural Media (FARM). ,

More than 50 per cent of green leafy vegetables collected around Calcutta during the four dry winter months (November-February) contained residues and the values were often in excess of human tolerance limits, he said.

(The Times of India 15 April, 1991, 6)

162 Undernutrition and intelligence

Childhood nutritional status was found to be significantly correlated with nutritional status at adulthood but was unrelated to adult intelligence. In a recent study conducted at the National Institute of Nutrition, Hyderabad, it suggests that childhood malnutrition per se may not influence adult intelligence. Since adult nutrition was found to be highly correlated with childhood nutritional status, it is concluded that malnutrition is one of the important factors in influencing the intelligence apart from socio-economic status of the family, especially educational level emerges as the most important factor influencing intelligence.

(Nutrition News 11(5), 1990)

Transfer of Technology & New Industries

163 Kanha Vanaspati's Project

Kanha Vanaspati Ltd is launching a Rs 7.61-crore project with an installed capacity of 18,750 tonnes per annum for the manufacture of vanaspati for the consumer market. The company has been jointly promoted by Atul Glass Industries and Uttar Pradesh State Industrial Development Corporation. The plant, being set up at Gathona in Ujhani in Uttar Pradesh, will be fully automatic. It has been supplied by Alfa-Laval. Most of the civil work at the plant is nearing completion. Commercial production has been commenced in November last year. The company hopes to reach 80 per cent capacity utilisation in the first full year of working, according to Mr. Atul Gulati, Managing Director.

(Chemical Products finder 9(8), 1991, 115)

164 Tapioca-based distillery

A Rs 3 crore distillery, based on tapioca and certain waste products as raw material, has recently gone on stream at Chinnabrahma Devam Village in Peddapuram mandal of East Godavari, Andhra Pradesh.

The unit will produce 60 lakh litres of extra neutral alcohol (ENA) per annum. Novo Enzymes from Denmark is supplying the enzymes required and the plant has gone through successfully the technological tests, the Managing Director said.

Under the process, the plant will use primarily tapioca, which is abundantly grown in and around East Godavari district. In addition, spoiled rice, maize, fruits, sweet potato and wasted jaggery may also be used as raw material for the unit, which is claimed to be the first of its kind in the country.

According to an industrial technologist at Hyderabad, alcohol production using non-molasses material like tapioca starch, broken rice, etc., is not novel and is widely in application abroad. However, it will cost higher than the alcohol produced from sugar molasses. Till sometime ago, the country's planners were stated to be opposed to alcohol manufacture based on agro products like tapioca.

Very recently this policy was being relaxed by the IDBI and it has accorded an "in principle" sanction to atleast three projects for manufacture of industrial alcohol based on tapioca flour.

Each of these projects are estimated to cost around Rs. 3 crores, having a daily capacity to produce 10,000 litres and are stated to be under appraisal by APIDC. However, sources stated the end product is likely to cost around Rs.6 per litre, which is higher by Rs. 2.25 over the sugar-molasses based alcohol.

It may be stated that a number of industrial units in AP are starved of industrial alcohol, with the Government diverting the bulk of alcohol for liquor manufacture.

As against a demand of around 2.60 lakh litres required by established industries in the State, hardly 15 per cent is supplied by the Government sources.

(Chemical Weekly 36(24), 1991, 50)

165 Soya product plant inaugurated in MP

The Madhya Pradesh chief minister, Mr Sunderlal Patwa on Monday inaugurated the biggest soya product plant of the country at the Mandideep industrial area near here, reports PTL.

The plant, set up at a cost of Rs. 17 crore to the private sector has a daily processing capacity of 450 tonnes of soyabean nuts.

It would also produce 350 tonnes of soya diet and 80 tonnes of soya oil daily and fetch Rs. 50 crore worth of foreign exchange from its exports.

(The Economic Times 8 January 1991, 2)

166 Soyabean project

A Rs. 8-crore soyabean project would be set up in a Bundi district under the planned industrial development programme, according to the District Collector, Mr. Ashok Singhavi.

With the setting up of this project, the soyabean grown in the district would be locally utilised, besides generation of employment potential for youths.

(Financial Express 19 February 1991, 3)

167 Nijjer agro to make tomato paste

Nijjer Agro Foods Ltd, a joint sector project of the Punjab Agro Industries Corporation is setting up a plant to manufacture 5,000 tonnes of tomato paste per annum.

Punjab Agro Industries has also set up a joint projects in the same line with Pepsi Foods and Montari Industries in the country.

The private promoters of the project Mr. Satbir Nijjer and Mr. W.S. Nijjer, have specialised in growing tomatoes, according to international standards and have been supplying to units like markfed Pan Foods and Kissan.

The plant equipment and machinery has been imported from Fenco of Italy and is fully automatic and computerised.

According to company estimates, their export turnover for tomato paste will touch the Rs. 5-crore mark in five years' time. Several countries and companies have already been identified and tied up with for this purpose.

The total project cost will come to about Rs. 11.5 crores. The company will have an advantage of getting the raw material from their own sources and is expected to meet their requirement of 330 tonnes of tomatoes per day.

(Financial Express 5 February 1991, 3)

168 Safflower oil extraction unit to be set up

The Khadhi and Village Industries Commission (KVIC) will soon set up a Rs. five crore safflower oil extraction unit in a backward area near Bijapur in north Karnataka, says PTI.

The KVIC chairman, Mr. Yeshvir Singh, said that 267 oil extractors owned by small farmers would be housed there under a 'cluster project'.

The Karnataka State Finance Corporation had agreed to fund individual oil extractors and the interest would be met by KVIC.
(The Economic Times 17 January 1991, 1)

169 Blueprint for Food Processing Industry

The Federation of Indian Chambers of Commerce and Industry (FICCI) and the Confederation of Indian Food Trade and Industry (CIFTI) are jointly preparing a blueprint for the development of food processing industries in Punjab, Jammu and Kashmir, Haryana and Himachal Pradesh. The action plan will spell out policy changes required for promoting food processing industry in the north India, type of linkages required between agriculture and food processing industry, region-specific industries to be set up in the area, type of fiscal and other support required from the Government for promotion of food processing industry.

(Chemical Products Finder 9(8), 1991, 117)

170 USSR keen to set up food processing units

The Soviet Union is keen on setting up food processing centres in India using cold extractions-membrane combined technology to process all types of vegetables, fruits and root crops.

An advantage of this technology is that it can use raw materials which have lost their marketable appearance as a result of transportation and storage.

The offer from the Soviet side was made to Indian food processors at a meeting of the Soviet delegation with the representatives of the Federation of Indian Chambers of Commerce and Industry (FICCI) and the Confederation of Indian Food Trade and Industry (CIFTI), held recently in Delhi according to a news release issued here on Wednesday.

The Soviet delegation led by Mr. Popov Nicolay of the State Committee for Science and Technology, stressed the relevance of the membrane technology to the Indian conditions.

The technology using a sophisticated method of preservation without the use of chemicals preserves 100 per cent of fruits and vegetable cells. One of the advantages of the technology is that it can be used by small-scale enterprises. With the adoption of this technology, it would be easier to produce not only concentrated juices but also dyes for confectionery, perfumery products and essential oils and edible oils.

An integrated processing plant using the membrane technology would require an initial investment of about Rs. 11 crores and production space of about 100-150 sq. metres, according to the estimates of the Soviet delegation.

The delegation said the entire cost of the project would be met by the Soviet Union if any firm proposal came from India. The Soviets also agreed to work out buy-back arrangements.

(Financial Express 1 March 1991, 5)

171 PVT parties to set up two fruit processing units in HP

The Himachal Pradesh Chief Minister, Mr. Shanta Kumar, on Tuesday said agreements had been reached with private parties for setting up two fruit processing units in Kullu and Shimla district at an estimated cost of Rs. 20 crore, reports PTI.

Making a statement in the Vidhan Sabha on Tuesday, the Chief Minister said the cider units to be set up in Kullu district would have capacity to process 20,000 tonnes of apple, while the processing unit to be set up in Shimla district at a cost of Rs. 15 crore would have 25,000 tonnes capacity.

(Economic Times 22 March 1991, 12)

172 Pepsi Food: Panel set up to oversee projects

The Ministry of Food Processing has constituted a three-member committee to visit the various projects of the Pepsi Food Ltd to ascertain the present status of the project, the Minister for Food Processing, Mr. Hukum Dev Narayan Yadav said here on Friday while talking to the members of the consultative committee attached to his Ministry.

The committee which met here on Friday discussed in detail the subject of fruit and vegetable processing. The members were informed that the present level of annual production of fruits and vegetables in the country is estimated at 70 million tonnes out of which the share of fruits is of about 33.6 per cent.

However, it was pointed out that only a small portion of fruits and vegetables being processed at present, while most of it was being consumed fresh.

The present installed capacity of the fruit and vegetable processing industry is estimated at 7.08 lakh tonnes. The Consultative Committee was informed that the Ministry of Food Processing has formulated several developmental schemes for the year 1990-91 for the growth of the fruit and vegetable processing industry.

The total plan outlay approved by the Planning Commission for the year 1990-91 for this sector is Rs. 7.6 crores.

Several suggestions were also made by members during the discussions. It was felt that the domestic demand base for fruit and vegetable products is very narrow. Unless this was rectified, it would not be possible to improve the performance of this sector.

(Financial Express 6 January 1991, 3)

Personalia

173 New Director of tea research association

Dr. B.C. Borbora has been appointed as the new director of tea research association - Tocklai experimental station, Jorhat. He was the chief advisory officer for Assam and Tripura.

He was closely associated with research on tea and transfer of technology to the industry. He is the fifth Indian scientist to be appointed as director of the Tocklai experimental station in 90 years. (The Economic Times 14 February 1991, 3)

174 FIEO president appointed to TDA committee

The commerce ministry has nominated Mr. Ramu Deora, president, Federation of Indian Export Organisations (FIEO), as a member of the steering committee of the Trade development Authority (TDA). (The Economic Times 9 May 1991, 14)

175 APEDA new chief

Mr. Gokul Patnaik took over on Tuesday as Chairman, Agricultural and Processed Food Products Export Development Authority (APEDA). He succeeds Mr. Fateh Singh Jasel, who has reverted to his State cadre on completion of his tenure at the Centre. (Financial Express 1 May 1991, 12)

ALUMINIUM FOIL CONTAINERS

Food Packaging for the Nineties

Aluminium foil containers have formed a major part of the food packaging industry for more than forty years. The abundance of aluminium as a natural resource, its innate properties, its ovenability and recyclability, combined with advanced production technology ensure that the foil is still unsurpassed as the most versatile form of packaging for prepared foods.

ALUMINIUM PRODUCTION

Aluminium is third most abundant element in the world after oxygen and silicon, and the most common metal. It forms some eight per cent of the earth's crust.

The ore is mined as Bauxite, which contains aluminium oxide, together with oxides of silicon, iron and other metals. The production process involves two main stages:

- ☐ Alumina, or Aluminium Oxide (Al_2O_3), is refined from the Bauxite in a caustic soda/high temperature process. All major impurities are removed; caustic solution is added to dissolve the alumina and this is finally settled out, filtered and heated to evaporate the water. The resulting fine white granular substance has a similar appearance to flour.
- ☐ Aluminium is obtained from the alumina in an electrolytic smelting process, during which the alumina is mixed with a molten cryolite (sodium-aluminium fluoride) in a pot lined with pitch and coke. The lining acts as a cathode so that when a carbon anode is applied to the surface of the mixture, and a strong electrical current passed through the pot, the alumina breaks down into molten aluminium and oxygen. The molten aluminium is siphoned off and transferred to furnaces where other elements are added to produce the desired alloy.

Slabs or ingots, of aluminium are 'scalped' to remove the cast surface and hot rolled until they become coils of aluminium strip with metal thickness of 2 to 4 mm (2000 to 4000 microns). These coils are then cold rolled to metal thickness of between 45 and 400 microns.

Two alloys and three temper groups are most widely used in foil container manufacture. 1100 (standard purity) was the first alloy evolved and contains between 0.4 and 0.6 per cent iron and between 0.1 and 0.2 percent silicon. However, for higher tensile strengths alloys AA3003 and AA8006 are now widely used. These alloys contain additions of manganese, about 1.25 percent, and copper, about 0.1 percent, which provide the additional strength.

In addition to these standard alloys, an ever-increasing range of different alloys is now available to cater for the specialist requirements of today's packaging market.

The three temper groups are hard, soft and various intermediate tempers e.g. half-hard, three-quarter-hard. Hard temper foil is aluminium foil essentially as it comes off the mill. Soft temper foil is annealed foil, meaning that the metal is recrystallised and pliable enough to dead fold. Intermediate temper foils are partially annealed to strike a balance between stiffness and formability. This balance allows stronger and more rigid containers to be made from thinner gauges than would be possible with soft foil; it also allows the manufacture of deep containers, which would crack if made from hard foil.

The foil is cut to width, and barrier-coated as required, at the foil rolling stage. The reels are then checked for quality, and securely packed to prevent damage and contamination, before leaving the factory for the container manufacturer.

CONTAINER MANUFACTURE

Aluminium foil containers are produced by high-speed press-forming, or combination press-and-air forming, from aluminium foil fed from a reel. The foil is precision-cut to container size and shape, and pressed to form by tools with tolerances of less than one hundredth part of

a millimetre. The finished containers are so light they are air-blown from the press, stacked and packed.

CONTAINER TYPES

There are two basic types of foil container, each of which can be tailored to specific uses:

- ☐ *Wrinkle-wall:* This is the most popular type of formed container. It offers a pleasing appearance and the extra strength which is particularly necessary in deep containers. Standard rim designs of various styles are available for different lidding options.
- ☐ *Smooth-wall:* This type of container is formed and drawn, providing smooth walls and a flat rim. In this way these containers are designed for the application of heat-sealed lidding to provide shelf-stable products that can be stored at ambient temperatures for long periods.

Sizes can range from an individual portion pack of jam to a multi-portion catering tray.

SPECIAL FINISHES

A range of decorative and protective coatings is available to meet the food manufacturers' demand for constantly improving product presentation. Coatings have been developed to achieve different requirements, for example:

- ☐ Barrier properties for high acidity foods
- ☐ Heat-sealing capability
- ☐ Product or brand identification
- ☐ Decorative effects

Colours can be clear or opaque, printed plain or patterned to incorporate design features or company logos. Embossing is another attractive finish which can be considered.

Internal coatings are generally used for protection, heat-seal or special effects. In particular, barrier-coating is used for the packaging of highly acidic foods such as rhubarb and tomatoes in order to prevent 'pitting' in the surface of the foil, and to ensure that no aluminium salts are formed.

THE ADVANTAGES OF ALUMINIUM FOIL CONTAINERS

There is no other packaging material which can match the beneficial features of aluminium foil containers:

Temperature Range: Foil containers are unaffected by the extremes of temperature encountered in the packaging and food processing industries, and may be placed in a hot oven straight from the deep freeze.

Barrier: Foil containers put an impermeable metal wall around their contents, preventing them from losing or picking up moisture, odour or flavour and avoiding food degradation from ultra violet light.

Hygiene: Foil containers are inert and do not support micro-organisms. They have no flavour or odour, and they do not absorb moisture or grease.

Economy: Foil containers are inexpensive to buy, and have been designed to fit into automated dispensing and filling machines, saving processing time - and money.

Strength: Foil containers are made to suit the specific needs of users by choice of alloy, temper and gauge, as well as form and rim style. Folds, wrinkles and embossing provide extra rigidity where required.

Versatility: Foil containers can be formed into many new shapes and sizes in addition to the many hundreds of types available from stock. The same container can be used for baking, blast-freezing, storing, distribution, re-heating in either conventional or microwave oven and serving.

Lids and closures: Foil containers can be lidded by simple mechanical closures. Smoothwalls are heat-sealable, offering the added facility of peel-off lids and long ambient storage life.

Low weight: Foil containers are formed from a lightweight metal only thousandths of an inch thick, so weight is never a problem in handling or transit.

* Since the late 1970's research has been carried out all over the world into the use of aluminium foil containers in microwave ovens. Results of this research, much of it from wholly independent sources, show that as long as certain simple rules are followed, aluminium foil containers can be used safely and effectively in microwave ovens. Not only are aluminium foil containers compatible with microwave ovens, but for certain types of food product they can also offer improvements over microwave-transparent trays. Because the microwave energy can only enter the food through one surface, more uniform heating results, with a reduction in overheating at the edges. In combination ovens, aluminium's inherent good heat conductivity contributes further towards improved performance.

Easy Handling: Foil containers provide the means of carrying food products through all stages of manufacture and distribution without removal from the package. Their high conductivity speeds processing - which ensures that the quality of baked and frozen foods is maintained.

Convenience: Foil containers give shoppers and caterers a strong, light package that can serve as a cooking utensil, deep-freeze containers, and serving dish.

Sales Appeal: Foil containers have a gleaming surface which stays clear and bright throughout their cycle of use.

Environmentally Friendly: Aluminium is infinitely

recyclable, saving energy and the earth's resources.* Washed containers may also be re-used in many different ways around the home, before being given for recycling.

* Aluminium is an abundant natural resource, forming about eight per cent of the earth's crust. Although there is therefore no danger of it 'running out' there is a need for conservation: less primary production would result in less mining, less disturbance of landscape and wildlife - and less energy consumed in the production process. Fortunately, aluminium is an infinitely recyclable product. It can be melted down time after time - achieving an energy saving of 95 per cent - without losing its quality. And because of this intrinsic benefit, it retains a high scrap value.

Excerpted from **Aluminium Foil Containers: Food Packaging for the Nineties**, a brochure produced by Hamson and Hamson on behalf of the Aluminium Food Container Manufacturers' Association (AFCMA) of UK, 1990.

(Reprinted from Tech Monitor, Nov-Dec 1990, 25-27)

FOR PHOTOCOPY (XEROX) OF PUBLISHED SCIENTIFIC/TECHNICAL ARTICLES PLEASE CONTACT US

The National Information Centre for Food Science and Technology (NICFOS) at the Central Food Technological Research Institute, Mysore, has got a good collection of scientific and other periodicals collected over the years in the area of Biological Sciences. If any article is needed for reference work, we will supply one copy from our wealth of collections. The cost of providing the copies is Rs.2/- per page (minimum charge Rs. 10.00). Please take advantage of this facility to overcome your problem in getting original articles.

Please Contact : The Area Co-ordinator
FOSTIS, CFTRI,
Mysore 570 013, India.

**The National Information Centre for Food Science & Technology,
CFTRI, Mysore, has compiled the following publications :**

Annotated bibliography on

- INSTANT TEA
(1969 - 1989 covering 77 abstracts)
- CASSAVA FLOUR
(1969 - 1990 covering 81 abstracts)

The cost of the publication is Rs. 50/- plus postage. Copies can be had from :

The Area Co-ordinator
FOSTIS
CFTRI
MYSORE 570 013.

Raw Materials

5 Organically grown foods

Organically grown foods have made a debut in USA and other advanced countries in recent years. This is due to increased awareness in educated consumers for natural foods grown without the use of man-made pesticides or fertilisers.

Consumers in affluent educated countries desire more fresh or fresh-like products that are visually appealing, full-flavoured, nutritious, convenient to prepare and serve, and pesticide-free at a reasonable price. However, with the current state of agricultural production, some of these goals are mutually exclusive. There is as yet no evidence that organically grown food or pesticide-free foods are superior in quality or nutrient content to conventionally grown foods or that they are more healthy than conventionally produced foods. Organically grown foods may be significantly more expensive, available in less variety than conventionally grown foods, and may present some health risks if fertilised with improperly treated compost or fresh, untreated animal manure.

A justification for the purchase of organically grown foods cannot be made as yet on the basis of any superiority in nutrition, taste or freedom from pesticides. Advantages, however, have been identified with the practice of organic farming. Advantages cited include agronomic and environmental benefits. The future of the organically grown foods market in affluent countries more appropriately depends on the viability of organic farming system as an alternative agricultural practice which offers effective solutions to the detrimental effects on the environment and non-sustainable aspects of conventional farming practices.

(Food Technology 44(12), 1990, 123-130)

77 Biotechnology way for vanilla

A Californian biotechnology company has developed a new method for producing vanilla in commercial quantities by growing cells from the vanilla plant in culture. The company, Escagenetics, is also looking to apply its technology to pharmaceuticals, including new anti-cancer drugs.

The development of culture-produced vanilla could turn out to have enormous commercial potential. The annual market for the

flavouring is worth \$ 200 million. But only 5 per cent of the vanilla is derived directly from the vanilla bean because of its high cost. Synthetic vanillin, a by-product of wood pulp processing, accounts for the rest.

Walt Goldstein of Escagenetics says that the new product will be "significantly less expensive" than traditional vanilla extract.

Tissue culture potentially has significant advantages over traditional agricultural production of valuable chemicals. Culture vessels represent a controlled environment so they can yield a reliable supply of plant products of uniform quality. Newly discovered plants could be tested and put to use quickly.

But in practice, it is not easy to keep plant cells happy in culture. They grow more slowly than animal or microbial cells, and they are extremely sensitive to nutritional conditions. To produce the desired product effectively, cells have to be kept in an unorganised state but they tend to clump up in culture flasks and begin forming plants.

Many commercially important compounds derived from plants occur only in certain parts of the plant, such as natural vanilla which is derived only from the bean. But all cells in the plant contain the same genetic information and so can produce any compound native to the plant. So, one could hope to grow cells from the shoot tips of a vanilla plant, and induce them to make flavouring.

Escagenetics has transferred the semi-organised callus lumps to larger vessels where they are agitated for several weeks. This "stressing" process seems to discourage further specialisation and the clumps are then broken up and transferred to a 70-litre tank. Here they produce vanilla flavouring which can be culled from the nutrient medium and crystallised.

Pigments, fragrances and essential oils have also been obtained in notable quantities from plant culture, but drugs may be the most important target for the technology. Many naturally occurring chemicals are too complex to be synthesised in the laboratory, so about one in four drugs are currently extracted from whole plants. (New Scientist 5 January 1991, 24)

178 High protein-yield soybeans on the horizon

The trade off between higher yield and higher protein content in soybeans finally may have been broken, according to researcher, Joseph Burton of the USDA.

Burton believes he is close to having the first high-yielding soybean that also contains almost 46% protein, compared with 42% in traditional commercial varieties. This research by Burton was done at the ARS Soybean and Nitrogen Fixation Research Unit in Raleigh, North Carolina.

'With higher protein, yields always dropped off to the point that there was little of any net gain in total protein' reports Burton. In conventional breeding programmes, the two traits protein and yield - have acted as if they were coupled or linked genetically. Burton used a breeding process called restricted index selection to decouple the trait.

(Chemical Weekly 36(39), 1991, 97)

179 Mesquite seed gum - A new gum for food applications

Mesquite - a pod-bearing shrub belonging to the *Prosopis* species. *Prosopis fuliflora*, a species native to Central America, is being widely used to recover and reforest arid and semi-arid regions in Brazil, Peru, Sudan, South Africa and India.

Mesquite seed gum, occurs in the endosperm layer of *prosopis* seeds. The gum consists of high viscosity polysaccharide. This polysaccharide is a galactomannan, comparable to those from carob (locust bean gum) and guar gum, suggesting a wide range of technical uses. These gums are important in processing foods because they improve water retention properties, reduce moisture evaporation, modify freezing rates and influence viscosity of food products. Plant hydrocolloids help to obtain smooth uniform body and texture, to enhance flavour and to improve whipping, thickening, gel stability and emulsification properties.

Much research is under way in Brazil, USA and Mexico on mesquite seed gum to develop it for use in food, textile and other applications as a possible substitute for, or in combination with, other common gums used by the food industry.

The researchers suggest that the name of the polysaccharide should be *prosopis* seed gum (PSG) instead of mesquite seed gum (MSG). In earlier literature, the term mesquite gum was referring to the trunk exudate - this should not be confused with the new seed PSG hydrocolloid.

At present mesquite is being commercially planted in regions of South America, Africa and India. Improved varieties have been naturally selected and cultivated. With the help of biotechnology, it should be eventually possible to eliminate undesirable properties as well as to improve the desirable ones. Despite all difficulties, mesquite is becoming an important crop in some regions. According to researchers in Brazil and USA an interesting interdisciplinary research area is opening, involving biotechnology, agronomy and food technology. There is a belief and hope that mesquite soon will achieve its rightful place as an important crop with ecological as well as financial benefits.

(Food Technology 44(11), 1990, 118-128)

180 Use of algae in human foods

According to scientific studies in Mexico the long life and robust health enjoyed by people inhabiting the 5 lake regions near Mexico city is directly related to the consumption of spirulina and other algae products that is abundantly grown in that region. Spirulina has 18 amino acids, three natural dyes and contains 72% of its weight as protein. In USA and Japan, spirulina is extensively grown for food uses, particularly for health-giving expensive foods.

The nutritional content and other qualities found in algae have brought about a rapid growth in 'their use in the food industry'. The gathering and processing of algae is becoming more and more common throughout the world. Brazil, with its 8000 km coastline is now able to compete with Morocco and Chile, the world's leading algae producers. India, should also take greater interest in the cultivation of spirulina for improving the nutrition and bridging the protein gap in the country.

(Chemical Weekly 36(26), 1991, 98)

Storage and Infestation Control

181 Liquid nitrogen extends fruit life

A British company has devised an innovative system that can improve the quality and shelf life of many foods by putting droplets of liquid nitrogen into their packaging on the production line.

The London-based BOC company has found that each droplet vaporises almost instantaneously, and as nitrogen expands 700 times in changing from a liquid to a gas, it gives a large dilution effect and rapidly displaces most of the air originally in the food pack, to create a controlled atmosphere that will not support life or most microbial action.

The first droplet dispenser machine is being used to package mixed fruit and nut products and extend their shelf life. The technique is also especially suitable for packing coffee, potato crisps, peanuts (in which oxygen in the atmosphere surrounding them can cause rancidity), peanut butter (in which oxidation can cause skinning or colour change), milk products - the flavour and odour of which can be affected by oxidation - cheese, dried potato and other foods that benefit from modified-atmosphere packaging.

Adjustable from a liquid nitrogen volume of 0.003 cc per cycle to 100 cc/cycle, the BOC machine can dispense, stop and re-start in response to programmable timer settings and sensing devices that coordinate it with the product packaging rate, upto line speeds of 80 packs a minute. A gas/liquid phase separator ensures that pure, high quality nitrogen, which is odourless, tasteless and inert with food, is supplied.

(The Hindu 22 May 1991, 19)

182 Vit. C stability in potato crisp

The effect of storage temperature on the Vit.C content of potato crisps has been studied by food researchers. Storage at 2°C showed little Vit C loss but as the temperature of storage increased the rate of loss became exponential. At 30°C there was a 50% degradation in six weeks and at 50°C in three weeks.

The maximum storage temperature for retention of Vit. C appeared to be 20°C something that supermarket and private households should note if they require any vitamin C in their crisps.

(Journal of Science of Food and Agriculture 53, 1990, 275-278)

183 Formulation for cockroach eradication

An improved approach to the control of cockroaches is being offered by Wellcome in a new product called Max-force. The result of cooperative product development between Cyanamid and Wellcome Environmental Health, Maxforce is presented in two ready-to-use formulations:

- a. a plastic bait station and
- b. a gel cartridge.

It is virtually odourless and because it requires no wide scale spraying, there is no need to clear areas prior to application. It also reduces the potential for contamination of operatives, non-target organisms and the environment. Its active ingredient is hydro methyionon, a amidino-hydrazone slow-acting stomach poison. This breaks down in light necessitating it's use within the bait station. It biodegrades by hydrolysis and according to Wellcome, does not leave behind any residues.

(Chemical Weekly 36(34), 1991, 94)

Food Additives

184 Sweeter than sugar

If you happen to use this sweetener, just take care. For, it is 200,000 times as sweet as sugar, and the two French researchers who

developed the sweetener believe that a compound sweeter than this may never be developed. Claude Nofre and Jean-Marie Tinti of the University of Claude Bernard in Lyon, in the course of modelling the sweetness receptor on the tongue, found a compound that was 50,000 times as sweet as sugar.

Later working in collaboration with an American food company they created a series of still sweeter compounds. Claude and Jean-Marie believe that there is only one type of receptor involved in the human response to a sweet taste. And the compounds that they have developed have reached the limit where only one molecule is needed to activate each receptor. So, a far lesser amount of the compound will now sweeten up one's tea.

(Chemical Weekly 36(36), 1991, 101)

185 Mass production of sweeteners

Japan's Food Research Institute has developed the technology to mass produce erythritol and xylulose for commercial use as low-calorie sweeteners.

Erythritol is a component of watermelons, grapes and fermented foods such as soy sauce. Researchers at the Institute developed a method using a transformed yeast strain to synthesize the substance from glucose.

Erythritol produced by the yeast has about 80 per cent of the sweetness of sucrose and is largely excreted via the urine. According to an Institute spokesman, the substance does not lead to tooth decay, despite its sweet taste.

Xylulose is a five-carbon ketose that is an intermediate in the hexose monophosphate shunt. Although the substance is absorbed along the gastrointestinal tract, it enters a different metabolic pathway from that of glucose, allowing its use by diabetics. The research group developed a method to mass produce xylulose by acid treatment and enzyme dissociation of the homopolysaccharide xylan.
(P.T.I. Science Service 10(10), 1991, 13-14)

186 Use of intense sweeteners in ASEAN

The safe use of sweeteners is examined by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) and by individual countries before approval is granted. The JECFA allocates an Acceptable Daily Intake (ADI) which is the level considered to be safe when consumed every day over a life time.

Not all the sweeteners mentioned are approved in the ASEAN region, the table shows the ADI and approvals in the ASEAN countries.

<u>Sweetener</u>	<u>ADI (mg/kg body wt)</u>
Saccharin	2.5
Cyclamate	11
Aspartame	40

Acesulfame K	15
Thaumatococin	not necessary
Sucralose	15
Alitame	Yet to be assessed

As the legislators permit a wider range of sweeteners, the ability to combine sweeteners offers further opportunities to the beverage manufacturer. The classic synergistic combination was cyclamate-saccharin which offered a low cost, fairly good tasting product. Today, more exciting mixtures are possible. The combination of aspartame-acesulfame K is an interesting combination. The sweetness of acesulfame K takes effect fast, but does not linger for long, where as aspartame is the opposite. That is, its sweetness effect takes longer and endures longer. Together they enhance each other and comparisons show that their sweetness profile is similar to that of sugar.

(Asia Pacific Food Industry April 1991, 56)

187 Antibacterial food additive

A Japanese company Nippon Oils and Fats Co. Ltd. has developed an antibacterial food additive using an extract from a thick-stemmed bamboo species as the main component.

The food additive is expected to satisfy the keen demand of consumers for natural additives since it can be compared in antibacterial effect with chemically synthesized additives.

The new additive is produced by shaving away the green epidermis of the bamboo called Moo Soo chiku to obtain an alcoholic extract and then by adding glycerol and glyceric fatty acid ester to the alcoholic extract.

A chemical called 2,6-dimethoxy parabengoquinon contained in the extract shows a powerful effect especially on putrefactive thermophilic bacteria in the soil. When used, the food additive, 3 per cent in a gravimetric ratio, is diluted by 1000 per cent before being applied to cut vegetables.

The tests showed that the number of bacteria on these cut vegetables is 1/200 that of bacteria on the same type of vegetables to which no food additive is applied that the former vegetables are superior in thermal stability to the latter when both are kept at 10 degrees celsius for four days. Marketing of the additive began last year at a price of 3700 yen per kilogramme.

(P.T.I. Science Service 10(9), 1991, 15)

188 Encapsulated flavours in USA

Encapsulated flavours containing natural antioxidants are replacing synthetic chemicals in foods because of educated consumers' increasing concerns over possible adverse health effects from

synthetic antioxidants and artificial preservatives. The food industry in advanced countries is also turning to encapsulated flavours because of their high flavour retention capabilities.

Encapsulated flavours can be used in dry beverage mixes, meat and savory products and dry mix dairy products, such as dips, salad dressings and sauces. In USA, the beverage industry has already replaced butylated hydroxy anisole (BHA) with encapsulated flavours, having antioxidant properties in some of its products.

Concerns over BHA's and BHT's safety in food products has increased in USA as they have been identified as carcinogens in animals. Although both BHT and BHA have been listed in the GRAS list, a new ruling on their use in food products is expected in USA in 1991. Fries and Fries, a leading flavour producer in USA has recently developed a new flavour encapsulation technology. The new technology prevents the loss of volatile flavours during standard spray drying. It also inhibits chemical reactions between two reactive ingredients that could result in undesirable off notes causing a loss of flavour.

Fries and Fries reports that the shelf life for citrus oils containing encapsulated flavours extends beyond one year, while the shelf-life for the spray dried flavour only lasts a few months. The company is now conducting tests to determine the shelf life of cereals containing the company's encapsulated flavours. The primary ingredients in encapsulated flavours are either maltodextrin, modified food starch or gum arabic and short chained saccharides. (Chemical Weekly 36(35), 1991, 97-98)

189 More effective water-soluble antioxidant for foods

Dainippon Ink and Chemicals, Inc, (DIC) has developed and will begin marketing in March a new efficient water-soluble antioxidant to be used for foodstuffs. The new substance derived from sunflower seeds has a higher degree of activity, heat resistance and solubility than other equivalents, plus safety, the company says.

The new antioxidant trademarked "Heliant" is obtained by refining and formulating natural ingredients contained in sunflower seeds. The ingredients serving to prevent oxidation are vegetable polyphenols, etc., the company says.

Heliant is more effective than L-ascorbic acid - a prevalent water-soluble antioxidant - as well as a tea-source antioxidant, catechin, now attracting industrial attention, with less application producing better effects, the company claims.

Heliant can also maintain effectiveness longer than other equivalents. It is used mixed with food materials or foodstuffs themselves. Heliant itself is yellow-brown but as it is used as diluted solution (100-200 ppm), it is in fact colourless and odourless when employed.

It can find its use in processed fishery products, processed meat products and frozen vegetables.
(Chemical Weekly 36(32), 1991, 134)

190 G6/7 Malto-oligosaccharides for food use mass-produced

Nihon Shokuhin Kako Co. - together with Kirin Brewery Co - has successfully developed "Fuji-Oligo G6/7" syrup containing as much as 40% of maltohexaose (G6) and maltoheptaose (G7), both categorized as starch-derived malto-oligosaccharide.

To this end, they had pioneered technology for mass-producing G6 and G7 - which are short for malto-oligosaccharide containing a series of six and seven glucoses, respectively.

Compared with malto-oligosaccharides already on sale, the new product (Fuji-Oligo G6/7) is less sweet (sweetness concerned is one-fifth that of sugar) and is capable of endowing food with a rich taste.

It has the advantages of both starch syrup in preventing deterioration of foods and finishing their surfaces. Unlike dextrin, it is free from offensive odour and materially helps powder food by means of spray drying since it has nearly the same hygroscopicity as dextrans.

G6 and G7 were previously not mass-produced and their application has hitherto been limited to a high-purity reagent aimed at assessing amylase contained in human blood. Mass-production of the chemicals is expected to expand application fields for starch sugar.

The new product (Fuji-Oligo G6/7) will be supplied immediately to Japanese food makers in sample form. The company puts its monthly sales at 50 tons in the initial stage. It has already commercialized G-2-4 malto-oligosaccharides for use in food production.
(Chemical Weekly 36(32), 1991, 132)

Processes

191 Cytolase for fruit processing

Cytolase is a new proprietary enzyme developed by researchers at Genencor International (USA) for fruit processing industry. It is a generally recognised as safe (GRAS) formulation derived from selected strains of Aspergillus niger and Trichoderma longibrachiatum and has both pectinase and cellulase activities.

When applied to fruit mash prior to separation of pomace and juice, the enzyme breaks down the juice-bearing structures, causing liquefaction or maceration of the fruit and thereby allowing for the flow of juice. Compared with existing products, the enzyme reportedly increases juice yield and decreases the need for pectinase in juice clarification.

For further information write to: Genencor International Inc., 180, Kimball Way, San Francisco CA-94080, USA.
(Food Technology 44(9), 1990, 117)

192 An enzyme inhibitor lowers egg cholesterol

Lovastatin a competitive inhibitor of 3-hydroxy-3-methylglutaryl-Co-enzyme A reductase, the rate limiting enzyme in the biosynthesis of cholesterol, has been added to laying hens' diets. With addition of up to 0.24% lovastatin in the hens' diet the cholesterol level in their eggs was reduced by up to 15%.

No drug residues were detected in extracts from the eggs.
(Journal of Agricultural and Food Chemistry 38, 1990, 1635-1641)

193 Low-cholesterol egg products

Australia now leads the world in the technology to remove cholesterol from eggs. The Australian STODAK process is cheaper and more efficient than comparable processes being developed overseas. It removes cholesterol without altering any of the egg's natural qualities.

The Fresher Egg Group has signed an agreement with CSIRO to develop the low-cholesterol egg technology. The Fresher Egg Group, with National Egg Products, is planning to market a full range of low-cholesterol egg products, to be called 'Low Cholegg', initially for commercial use and for supermarket shelves in about 18 months.

This development has arisen from the CSIRO discovery of a means of selectively extracting cholesterol from egg and dairy products by an adsorption process, from the deregulation of the egg industry in New South Wales, and from the Federal Government's policy of encouraging Australian commercialisation of CSIRO research.

The new process will boost Australia's exports. The Fresher Egg Group has a processing plant that meets the stringent requirements of the United States Department of Agriculture.

For further information contact: Mr Frances Pace, Pace Farms, Dr David Oakenfull, CSIRO Division of Food Processing.
(Food Australia 43(3), 1991, 94)

194 Faster beer with immobilised yeast

Scandinavian researchers are using immobilised yeast in experiments aimed at speeding up the beer-making process.

The advantages of using immobilised yeast are that the processing time, normally 12 to 20 days or more, can be reduced to about two hours, due to high yeast cell numbers, and extremely good contact of the yeast and beer in the immobilised yeast reactor.

The process includes an initial heat treatment of beer to convert diacetyl precursors to free diacetyl. The maturation takes place without any need for added chemicals or manipulated yeast. The yeast used is the normal one of primary fermentation.

"In the traditional batch process, yeast is added to boiled and cooled wort which ferments into green or cloudy beer". The beer matures in storage tanks during a process which takes about three to six weeks, he said.

Continuous processes can function without interruption for several months. As a consequence of the high concentration of cells, the beer can be matured within only a few hours instead of several weeks, thus enabling an appreciably larger volume to be produced.

One of the most promising methods is to use immobilised yeast, either in the main fermentation process or during storage. In Finland, this has already progressed to a semi-industrial scale. Storage times have been slashed from weeks to only a few hours.

When both primary fermentation and storage are superseded by continuous processes, the volumetric productivity of the beer-making process can be increased more than ten times over.

As one element of the product currently under way at VTT, primary fermentation using immobilised yeast has been studied. Brewer's yeast is attached to a granular carrier material which is packed into a column and to which sweet wort is supplied. As the wort flows through the column, the immobilised yeast ferments the wort into beer.

"In laboratory trials, scientists have succeeded in cutting the primary fermentation time from seven days to 16 hours. If this process is then combined with the previously developed storage process, the overall process time is likely to be about 24 hours.

The composition of the aromatics used in the beer corresponds to that in the traditional batch process. The different yeast growth stages - required for balanced formation of aromatics - are well expressed in the column. "The microbial cleanliness of the column has been good throughout the entire trial period," Kronlof said.
(P.T.I. Science Service 10(6), 1991, 9-10)

195 Milk with low lactose content developed in Australia

A new type of fresh milk developed to overcome 'milk reaction' in lactose intolerant adults and children have been recently marketed in Australia by the Queensland Dairy Industry Authority (QDIA). The low lactose milk to be marketed as Lacto Lo, retains the look, taste and food value of regular milk with the lactose content reduced by 50%.

The new milk has been developed as a joint venture by the QDIA and Cotton Corporation. The clinical research involving lactose intolerant subjects, conducted at the Univ. of Sydney showed that Lacto Lo overcame milk reaction discomfort in most cases. The rise in breath hydrogen level, an indication of lactose intolerance, was reduced on average from a regular milk reading of 33.5 to 6.9 for Lacto Lo. Most of the lactose intolerant subjects in the study could tolerate up to 300 ml of two glasses of Lacto Lo milk in one sitting without symptoms.

(Indian Dairyman January 1991, 36)

196 Arrowroot powder in ice creams

Researchers of the College of Veterinary Science, Hyderabad, report that arrowroot powder can replace the milk solids-not-fat (SNF) content of ice creams up to 40 per cent without affecting the quality of ice creams.

Substituting milk with arrowroot powder also brings down the cost of production by about 12 per cent, they say.

The scientists tried out various mixes containing 20, 40 and 60 per cent arrowroot powder as a replacement for milk SNF components. They found that the composition of the various mixtures was identical to that of the control which did not contain arrowroot powder. Their composition was 10 per cent fat, 11 per cent SNF, 15 per cent sugar and 0.3 per cent stabiliser.

The pH of the ice creams containing arrowroot powder increased according to the concentration of the powder which has alkaline properties.

But the specific gravity of the mixtures decreased due to lower specific gravity of arrowroot powder.

The relative viscosity also increased after adding arrowroot powder, probably due to the fact that the hydrophilic colloids can hold large quantities of water to produce a semi-rigid gel which imparts high viscosity.

According to the researchers, the stabilisation of the substituted ice creams is one of the factors responsible for the smooth texture and other physical properties.

(P.T.I. Science Service 10(7), 1991, 4)

97 Palm oil extraction using microwaves

Microwaves, better known for their use in ovens for heating, have recently found an entirely different application - extraction of palm oil.

Scientists from the Regional Research Laboratory (RRL), Trivandrum, have successfully used microwaves to inactivate the lipolytic enzymes present in oil palm fruit. The fruit was exposed to microwaves for short durations.

This treatment also simultaneously loosens the fruits which are strongly attached to the spikes of the branches.

The RRL studies, conducted on a bench scale, have shown that some of the unit operations in conventional methods of palm oil extraction as well as palm kernel oil extraction are eliminated in the microwave method.

During conventional processing, the loosening of the fruit and oil extraction are achieved at a pressure of 31.5 kg per square cm of steam applied for 45 min.

The new method obviates effluent problems and reduces the free fatty acid content to as low as 0.5 per cent, according to a newsletter of the Council of Scientific and Industrial Research (CSIR).

Microwaves have also been successfully applied to activate rice bran lipase.

(P.T.I. Science Service 10(8), 1991, 4)

Byproducts and Waste Utilization

198 Seasoning liquid from fish plants waste

Japan Organo Co. and the fishermen's association of Aomori Prefecture in Japan, have jointly developed a plant to produce seasoning liquid from waste liquid from fish processing plants by means of enzymes and membranes.

The plant is designed to recover proteins and amino acids in waste water in a liquid state by using protein-decomposing enzymes, fine filters, reverse osmosis membranes and other means. In the final process, the liquid containing peptides and amino acids obtained through the reverse osmosis membrane, is concentrated a second time by a vacuum distillator into a natural seasoning liquid.

The residue can also be used as a bleaching liquid after it has been deodorised.

Tests on the pilot plant showed that about 60 kg of seasoning liquid was obtained from 4 tonnes of waste water produced after processing Alaska pollacks. The break-even capacity of the plant is expected to be about 50 t/d of water waste. The plant is expected to cost about Y 300 million.

(Asia Pacific Food Industry March 1991, 82)

199 Starch from damaged grains

Scientists have developed for the first time in the country an energy-efficient low-cost technology to produce starch from damaged grains on a small-scale level.

Traditionally, starch is produced in large-scale plants using maize or other cereals as a raw material.

However, many foodgrains such as wheat, maize, sorghum and rice often get damaged due to untimely rains and hailstorms at harvest time or become spoilt during storage in godowns. Over Rs. 30,000 million worth of damaged fruits, vegetables and cereals are estimated to pile up every year in India.

A scientist from the Indian Institute of Technology, Kanpur, in collaboration with the Mathura-based Gehlawat Agro Pvt. Ltd., has now developed a low-cost technology to retrieve starch, as well as proteins, fat and fibre, from damaged grains on a small-scale level.

In an experimental plant set up at Mathura, scientists cleaned and soaked the damaged grains in hot water (at a temperature of 55 to 58 degrees celsius) containing a preservative. Partial grinding of the grains gave a wet slurry.

The scientists removed the light germ which was floating on the water by a skimmer, dried it and extracted its oil using oil expellers.

Next they ground the germ-free aqueous slurry of partially crushed grains to release the fibrous material and separated it using mechanical sieves.

The protein and starch fractions, which filtered through the sieves, were made to flow down a narrow inclined channel, about 30 metres in length, in a process known as the "tabling method". Starch, being heavier settled on the tables and the lighter protein fraction was carried down the steam.

The starch fraction finds major use in textiles, paper, food and pharmaceutical industries. The recovery of starch is expected around 50 per cent.

(Research and Industry 35(4), 1990, 214-218)

200 Manure from distillery spent wash

The environmental protection department in Walchand College of Engineering, Sangli, Maharashtra, has successfully developed a process to convert distillery spent wash into a useful manure.

As it is well known, spent wash - an offensive smelling effluent from distilleries associated with sugar mills - causes serious damage to the environment by not only giving out a foul smell but also by making infertile the soil into which it is let out.

In the new process the spent wash is carried through pipes into specially dug pits near the sugar mills where it is mixed with pressmud - another sugar mill byproduct - along with other available organic wastes.

After about a week, a solid mass forms which is thrown into the open for drying. After another three weeks the solid mass gets converted into an organic manure.

The nearby wells or standing sugarcane crops are in no way affected by the production of organic manure and the filthy smell emanating out of spent wash is also checked in the process.

The organic manure contains 2-2.5 per cent nitrogen, 1.5-2 per cent phosphorous and 3.5-4.5 per cent potassium. The fertiliser value of the compost is almost 2 to 3 times more than the traditional farm yard manure.

The process returns to the soil elements that the sugarcane crop borrows from it, thus conserving the quality of the soil. The organic fertiliser restores the soil's fertility, increases crop productivity and cuts down the consumption of chemical fertilisers.

A private firm, Alfa Laval (India) Ltd., has put up a unit to manufacture this compost which they call "Bioearth" at Varnanagar in Maharashtra's Kolhapur district.
(P.T.I. Science Service 10(9), 1991, 2-3)

Computed specific waste generation factors for different principal fruits and vegetable processing units

Type of fruits/vegetables	Processing capacity in TPD and category	Flow m ³ /d	Raw waste water characteristics* BOD Kg/d	TSS Kg/d	Specific pollution load (Kg/ton of raw fru & veg)	Specific solid waste generated Kg/t		
Fruits								
1. Pineapple	6 Large	87	60	20.5	14.5	10.0	3.4	482
2. Apple*	1 Small	3.0	3.0	0.5	3.0	3.0	0.5	400
	100 Large	689	584	31.0	6.9	5.8	0.31	300
3. Mango	1 Small	0.85	0.85	0.2	0.85	0.85	0.2	225
	10 Large	54.0	42.1	8.7	5.4	4.2	0.9	450
	1 Small	5.4	4.2	0.87	5.4	4.2	0.9	400
4. Guava	4.5 Large	19.5	19.0	9.9	4.3	4.2	2.2	200
Vegetables								
5. Tomato	15 Large	123	78.4	34.6	8.2	5.2	2.3	300
	1 Small	2.0	1.6	0.91	2.0	1.6	0.91	275
6. Greenpeas	2 Large	50.4	86.1	9.7	25.2	43.0	4.9	200
	0.5 Small	12.6	21.5	2.4	25.2	43.0	4.9	200
7. Cabbage	2.5 Large	28.0	66.5	6.6	11.2	26.6	2.6	100
	6.5 Large	109	262	56	16.5	40.3	8.6	160

* The large scale unit produces only the apple concentrate and the small scale unit produces apple juice/pulp.
(Productivity 31(4), 1991, 657)

Equipment and Machinery

202 Betelnut cutting machine

The Betelnut cutting machine has two ball bearings and five steel blades. It can be manually operated or fitted with 1/2 HP, 1,440 electric motor. Suitable for cottage industry, the betelnut cutting machine has a production capacity of 15 kg per hour and does not produce any wastage during the operation.

For further information write to: Ajit Manufacturing Co, Dhebarbhal Road, Opp Bhutkhana, Rajkot, Gujarat 360 001.
(Industrial Products Finder 19(6), 1991, 140)

203 New CTC Machine

A new tea processing machine developed for cutting, tearing and cutting (CTC) tea leaves eliminates any pre-conditioning required before processing the leaves in conventional methods. The machine has been developed by Mr Mohijit Sen, proprietor of the Calcutta-based Trade and Industry Pvt Ltd. The machine will result an overall reduction in machinery, maintenance and labour cost. The Sennova tea processor, as the machine is called, is being exported to Turkey, Bangladesh and Kenya. Sri Lanka and Indonesia have shown keen interest in buying the machine. The new machine is essentially an improved version of the original designed by Mckercher.
(Industrial Products Finder 19(7), 1991, 79)

204 Paddy hulling and polishing machine

A Swiss firm has designed, specifically for the village economy, a small versatile machine that hulls and polishes paddy rice. Powered by a simple air cooled diesel motor, this device can be converted to other uses too: coffee processing, electricity generation, running irrigation pumps etc. It is capable of processing 300 kilos of rice or 250 kilos of coffee per hour, with an efficiency of about 98% - conserving energy at the same time.

For more information contact: Schweizer Walter, Bergblickstrasse 6, CH-8630 Ruti, Switzerland.
(Tech Monitor Jan-Feb 1991, 27)

205 Mango peeler-slicer

An advanced mango peeler-slicer has been invented in Australia. The machine produces peeled and sliced pieces from mango cheeks, which have been cut from whole fruit. Mango cheeks are placed on a belt with the cut surface down, and are continuously conveyed into the machine. Very little flesh is left on the skin and all surfaces of the slices are cut, so that their appearance is excellent. Production rates are said to average around 400 kg of slices an hour, corresponding to fruit input of 1.2 tonnes an hour.

For further information write to: Agricultural Engineering Section, Queensland Department of Primary Industries, Australia. (Tech Monitor Jan-Feb 1991, 27)

206 Oil Expeller

An Indian R&D organisation has designed and developed a double-chamber modern oil expeller (10 tonnes per day capacity). The advantages of this expeller compared to the conventional ones (33" x 6" dia) are as follows: 1.5 to 2 per cent extra oil recovery, the quality of oil conforms to Indian Standards and the cake is bright green without any discolouration.

For further details write to: Mechanical Engineering Research and Development Organisation, Gill Road, Ludhiana 141006, India. (Tech Monitor Jan-Feb 1991, 27)

207 Foot-pedalled cassava grater

A Filipino university has designed and fabricated a foot-operated cassava grater. The grater has a capacity of 31 kg per hour and an efficiency of 86.3 per cent. It is made of wood, steel tubes and hacksaw blades. Its twelve pieces of hacksaw blades are attached to a 36-inch diameter flywheel. The feeding hopper is made of galvanized steel sheet. The driver gear has 52 teeth, while the driver gear attached to a shaft has 16. The prototype was fabricated at a cost of US \$ 105.55.

For more details contact: Andres Celestino, President, University of Eastern Visayas, Catarman, Samar, Philippines. (Tech Monitor Jan-Feb 1991, 27-28)

208 Cap sealing and threading machine

CAA manufactures a single operation floor model machine to thread and seal pilfer-proof caps used mainly in the food and pharmaceutical industries. The construction and working being simple the machine involves very little operator skill. The bottle is placed on the pressing pad along with its cap by pressing the compression spring

handle. Threading and sealing is achieved by rotating the crank lever clockwise whilst pressing the sealing and threading handle against the bottle. Different sizes of bottles and caps can be sealed.

For more details write to: Coimbatore Aeration Accessories, 220 Ranga Konar Street, Kattoor, Coimbatore, Tamil Nadu 641 009. (Chemical Products Finder 9(11), 1991, 101)

209 Automated laboratory fermentor

Laboratory fermentors with a modern electronic controls are the potential instruments in micro-biological, biochemical and pharmaceutical research. They are most important for the development and optimisation of fermentation processes in the production of chemicals, antibiotics, enzymes and organic acids. To meet this need, Murhopye have introduced an extremely flexible modular laboratory fermentors for the cultivation of micro-organisms in a batch culture to a fully instrumented continuous culture system. This modular bench fermentor is simple in design and equipped to minimise aseptic preparation and handling. The main vessel is made of pyrex glass cylinder incorporating stainless steel top plate with 16 ports for various entries. Hollow baffle type heat exchanger serves the triple purpose to control the culture temperature in a baffle and air sparger. Provision for interchangeable sparger and stirrers makes this equipment most flexible to handle the manifold nature of the microorganisms to be grown to meet their many environmental demands. Completely modular electronic control system controls the various parameters like RPM, air flow, pH, dissolved oxygen, foam and continuous culture and indicated in a digital meter can be connected to recorder.

For more details write to: Murhopye Scientific Company, B-11, Metagalli Industrial Area, Metagalli (Karnataka), Mysore 570 016. (Chemical Weekly 38(31), 1991, 110)

210 Dehydration ovens

Kerry Jost Engg Ltd offers specialised drying systems for specific applications. A typical application is the treatment of refrigerator components, wherein dehydration levels are brought to acceptable standards of moisture content. Such specialised tailor made dehydration systems are as a result of the experience accumulated over years. The heat transfer in such systems is brought about by convection air currents, through centralised blower system(s). The hot air is guided by a system of louvres, to achieve temperature uniformity. Energy saving devices are also incorporated in the system. An air curtain at the feed end prevents heat loss from the system and as also ingress of dust into the system. A dual set point controller aids the process further. The exit end is so designed that the components from the conveyor can be manually handled. The drive system for the conveyor which carries the jiggling arrangement for the component, comprises a motor, suitable gearing arrangement to achieve the rated output and relevant tensioning devices. Provisions for dual

conveyors are also offered. A centralised control panel with accessories, controls all the system parameters. Standard or custom built, batch or conveyorised dryers and sterilizers are also in the manufacturing range, catering to the drying, sterilizing, paint curing and baking operations.

For further information write to: Kerry Jost Engineering Ltd, C-39, 11 Avenue, Anna Nagar, Madras 600 040.
(Industrial Products Finder 19(6), 1991, 15)

211 Biscuit wrapping machine

MOI Engineering has launched the Brisk biscuit-wrapping machine suitable for rectangular and square biscuits. The machine wraps biscuits into 50 and 125 gm packets at speeds of up to 85 packs per minute with manual feeding. It can go up to 120 packs per minute with the automatic counting and feeding system called Briscount.

The machine does a single or double wrap of wax-coated paper. BOPP (biaxially-oriented polypropylene) film and other heat-sealable films for both inner and outer wraps. It has a tumble box design with spring-loaded holders to handle wide variations in stack lengths between ± 4 mm. An automatic print registration system is provided for printed films.

For more details contact: Marketing Manager (Packaging Machinery), MOI Engineering, A-7, Industrial Estate, S.A.S. Nagar (near Chandigarh), Punjab 160 051.
(Business World 5-18 June 1991, 25)

Packaging

212 Smart packaging

An intriguing chain reaction is taking place in advanced countries in food packaging. What is emerging is a new generation of 'smart' packages. These packages do more than just offer protection. They interact with the product, and in some cases, actually respond to changes. More information on smart packaging can be obtained by referring to the report Global Opportunities in Smart Packaging Materials for Consumer Products brought out by a US firm.

For details contact: Technology Catalysts Inc, Falls Church, Virginia, USA.
(Tech Monitor Jan-Feb 1991, 29)

213 New packing for food items

Package India manufactures disposable thermoformed EPS (expanded polystyrene), similar to thermocole, for serving or packaging of food items. Thermoformed EPS plates and trays come in various sizes and thickness and has a wide range of applications. They can be used as a disposable serving plates in place of paper plates. The folding type boxes can be used as carry home packs for fast food items so that they will remain warm, thanks to the heat insulating characteristic of the product. Sizes available for disposable plates are 3", 4", 5", 6-1/12", 8" and 10". Folding type boxes are available for holding capacities of 250 gm, 500 gm or 1,000 gm food products. Multi-cavity trays of various sizes are available. The thickness of the products range from 1.0 mm to 3.0 mm. Trays or boxes can also be developed to suit special applications.

For more details write to: Package India No. 4-A (NP), Kubera Ganapathy Street, Mathiyalagan Nagar, Padi, Madras 600 050.
(Chemical Products Finder 9(11), 1991, 105)

Analysis

214 Portable kit for determining water content in oils.

A handy portable kit from S.S. Engineering Industries measures exact water content in oils on site. The kit named as Hydrogage gives direct readings of water content in alcohol and vegetable oils. The Hydrogage can measure from 0.05% upto 1.24% by volume of water. The accuracy of measurement is more than 95%. It takes just a few minutes to take the readings on the site and they match with the laboratory method. The Hydrogage can be used by any operator and it does not need any specialised training.

Water in oils is undesirable and its presence affects the quality and stability of products and can contribute towards rust in the system. Present laboratory method of determining water content is laborious, time consuming and seldom practical at work situations. Hydrogage is helping the industry to check the condition of oils by determining water content and deciding the remedial corrective action to bring the product back to its normal condition.



For further information write to: S.S. Engineering Industries, H-35, South Extension Part-I, New Delhi 110 049.
(Chemical Weekly 36(31), 1991, 105)

215 Home kit to detect adulteration

A 100-rupee kit that enables consumers to themselves detect adulteration was released in Madras.

The kit has nine solutions, test tubes, a watch glass, dropper and a filter paper to test samples of such house-hold items as mustard oil, edible oils, ghee, butter, coffee powder, tea, pulses, chilli, turmeric powder, asafoetida, milk, sweets, juices, and jaggery, for a variety of adulterants.

The home analytical method has been devised by chemistry faculty members D.P. Sankaran of Loyola College and S.Geetha of Stella Maris under the auspices of Enviro Club.

It is possible to detect the presence of common adulterants like agremone oil in mustard oil, mineral and castor oil in edible oils, vanaspati in ghee and butter, and chicory/tamarind in coffee powder, through basic chemical tests. A do-it-yourself guide is given along with the chemicals.

Admitting that the cost of the kit is rather high for the average household, its promoters say they are ready to accept sponsors who can advertise to lower the cost.
(Health for the Millions December 1990, 57)

Commercial Intelligence

Production (Raw Materials)

216 All-India final estimates of food grains, 1988-89

State	(Production in Tonnes)						
	Rice	Jowar	Bajra	Maize	Ragi	Wheat	Barley
Andhra Pradesh	1,05,58,800	7,48,700	2,05,200	5,19,700	1,78,700	7,500	-
Arunachal Pradesh	1,35,821	-	-	40,234	-	4,508	-
Assam	24,39,303	-	-	10,481	-	1,22,330	-
Bihar	61,11,052	2,554	6,465	10,81,210	67,107	35,57,048	47,632
Goa	1,29,191	-	-	-	921	-	-
Gujarat	8,69,700	4,25,100	14,87,500	4,55,900	29,800	15,12,500	-
Haryana	14,37,000	39,000	9,58,000	43,000	-	61,99,000	1,30,000
Himachal Pradesh	89,827	-	-	4,83,125	2,269	5,12,541	34,404
Jammu and Kashmir	5,79,600	-	5,380	4,41,800	-	2,45,600	6,102
Karnataka	24,10,818	15,11,069	2,07,220	6,77,657	11,43,225	1,61,655	-
Kerala	10,13,677	789	-	-	930	-	-
Madhya Pradesh	48,80,000	18,81,000	1,57,900	12,56,800	5,040	46,33,800	1,02,600
Maharashtra	26,52,100	42,77,900	9,00,500	1,40,300	2,27,300	10,43,200	2,600
Manipur	3,19,720	-	-	12,180	-	-	-
Meghalaya	1,05,600	-	-	20,600	-	6,700	-
Mizoram	53,000	-	-	9,500	-	-	-
Nagaland	1,30,000	-	-	19,290	-	-	-
Orissa	52,96,510	28,980	6,690	1,97,730	2,30,700	69,740	-
Punjab	49,42,000	2,800	15,000	2,92,000	-	1,15,76,000	1,21,000
Rajasthan	1,85,764	5,39,331	26,94,136	12,18,216	-	38,64,060	4,13,538
Sikkim	18,600	-	-	57,000	5,400	17,800	1,200
Tamil Nadu	55,90,038	5,61,003	3,03,105	47,158	2,73,360	71	-
Tripura	4,57,470	-	-	-	-	6,059	-
Uttar Pradesh	96,24,477	4,91,000	8,35,508	12,25,656	1,98,298	1,96,91,408	8,45,384
West Bengal	1,05,59,830	329	67	92,841	12,907	6,24,970	8,748
Andaman & Nicobar Islands	23,625	-	-	-	-	-	-
Dadra & Nagar Haveli	18,902	495	-	-	2,380	468	-
Delhi	2,858	7,602	3,063	124	-	33,616	1,369
Daman and Diu	1,600	-	4,522	-	-	-	-
Pondicherry	61,989	-	680	-	1,053	-	-

(Agricultural Situation in India October/November 1990)

217 Record mustard output likely

Production of mustard crop is likely to touch a record level of 55-60 lakh tonnes during 1990-1991. This is 15-20 lakh tonnes more than the last year's production of 41.2 lakh tonnes.

The record production is largely due to the better utilisation of the favourable climate conditions and incentives given to oilseeds growers by way of better technology, more efficient delivery services, expanding input supply and incentive prices.

An additional four lakh hectares were brought under cultivation taking the total area under the crop to 53.29 lakh hectares. The encouraging feature of the year has been the response of the rainfed crop like mustard to the improved technology inputs.
(Financial Express 20 April 1991, 1)

Production (Industrial)

218 Processed food items' dimensions by 1995

(lakh tonnes)

Sectors/Items	Present production	Projected production
Organised Sector		
Bakery products	12.59	34.00
Confectionery	0.26	0.37
Fruits and Vegetable products	2.17	7.17
Chocolate	0.06	0.29
Dairy products - processed		
- Baby foods	0.49	0.95
- Malted milk food	0.28	0.46
High protein food	0.09	0.17
Starch and derivatives	1.42	3.16
Marine products	1.00	2.50
Traditional Sector		
Spice powders	0.30	0.36
Vermicelli	0.80	0.97
Poha/murmura	7.68	9.29

(The Economic Times 2 May 1991, 1)

219 Installed capacity and production of processed foods

Product	Unit	No. of Units	Inst. Cap 1987-88	Production
Biscuits	Lakh T	33	1.48	1.28
Confectionery	Lakh T	22	0.36	0.26
Bread	Lakh T	21	1.68	1.22
Breakfast foods				
Pearl Barley	000T	4	6.59	1.10
Corn flakes	000T	3	2.55	0.36
Oat flakes	000T	1	0.02	-
Macaroni Vermicilli noodles etc.	000T	5	33.40	9.30
Malt extracts	000T	5	11.30	7.00
Guargum	000T	9	46.00	8.80
Weaning food	000T	3	10.30	9.50
High protein food	000T	9	13.61	7.20
Cocoa butter substitute	000T	1	3.00	0.23
Egg powder	000T	1	2.67	0.07
Starch	Lakh T	11	1.06	1.42
Glucose	lakh T	12	8.50	0.52
Chocolates	000T	6	1.50	7.60
Drinking chocolates	000T	3	0.64	0.36
Cocoa powder	000T	5	32.83	0.24
Beer	Lakh Kl	32	-	1.99

(Chemical Weekly 36(29) Supplement, 1991, 74)

220 Production of Edible Oils in India 1980-81 to 1988-89 (000 MT)

Oil Year (Nov-Oct)

Oil Source	1986-87	1987-88	1988-89
Groundnut	1352	1347	2197
Mustard	797	1057	1350
Sesamum	139	181	208
Sunflower	151	229	143
Safflower	69	90	84
Niger	28	38	36
Soyabean	80	81	135
Cottonseed	244	226	307
Coconut	188	224	224
Total*	3739	4197	5505

* Also includes non-edible oils

Sources: Industrial Data Book 1988
Indian Vanaspati Producers' Association
Directorate of Vanaspati
(Productivity 31(4), 1991, 624)

221 Supplementary sources of Edible Oils (lakh tonnes)

Commodity	Realizable Potential	Current Production	Untapped Potential
Rice bran	6.0	3.2	2.8 (46.7%)
Cottonseed	4.5	2.8	1.7 (38%)
Oil Seeds of tree & forest origin	6.0	1.2	4.8 (80%)
Oil Cake	5.5	1.9	3.6 (65.5%)
Total	22.0	9.1	12.9 (58.6%)

(Productivity 31(4), 1991, 627)

222 Solvent extracted oils - Output ('000 tonnes)

Type of Oil	1987-88	1988-89
Groundnut	24.9	55.4
Cottonseed	9.1	8.5
Ricebran	290.7	316.3
Soyabean	108.2	194.6
Salseed	6.5	9.2
Sunflower	35.7	25.2
Safflower	2.8	2.0
Coconut	3.6	4.1
Sesamum	2.4	2.7
Nigerseed	0.3	0.1
Linseed*	-	0.1
Castor*	2.6	4.3
Neem*	8.9	9.8
Mahua	9.6	6.1
Mango Kernel	3.7	4.2
Mustard	26.1	78.3
Others	7.1	9.0
Grand total	542.3	730.0

*Non-edible

(Productivity 31(4), 1991, 627)

Export

223 Export of oilseed extractions

(Qty. Lakh tonnes/Value Rs Crores)

Extractions	1989-90		1990-91 (Estimates)	
	Quantity	Value	Quantity	Value
Soyabean	8.55	330.75	10.00	385.0
Groundnut	4.30	85.00	6.50	143.0
Rice Bran	6.10	63.00	6.50	70.0
Rapeseed	7.00	89.00	8.00	103.0
Cottonseed	0.37	7.00	0.75	14.0
Sunflower	0.66	9.50	1.00	14.0
Salseed	0.72	6.00	1.00	9.0
Others	0.25	4.75	0.75	15.0
Total	27.95	595.00	34.50	753.0

(Productivity 31(4), 1991, 638)

224 Marine products exports

Marine products exports in 1990-91 have shown a 38.2% increase in value over the previous year, with a record high figure of Rs. 877.55 crore. The increase in terms of volume was 22.56% at 1,35,847 tonnes.

The exports for the year has exceeded the target of Rs. 850 crore set by the Commerce Ministry according to a press note of the Marine Products Exports Development Authority, (MPEDA).

Of the 15 ports through which exports have taken place Cochin ranks first with 36.81%.

(The Economic Times 17 April 1991, 14)

225 Jaggery export ceiling raised

The Government has decided to enhance the ceiling for export of jaggery (gur) during the period from october 1, 1990 to September 30, 1991 from 5,000 tonnes to 10,000 tonnes.

According to a public notice issued here, the validity of the export licences under the public notice No. 3 - etc (PN) 91, issued on January 18, 1991 will be upto June 30, 1991.
(Financial Express 21 April 1991, 13)

226 Export of iodised salt allowed

The Government has allowed export of five lakh tonnes of iodised salt during 1991-92.

For purposes of export licensing, three lakh tonnes of iodised salt (fit for human consumption) has been placed at the disposal of the Joint Chief Controller of Imports and Exports (JCCI&E), Ahmedabad.

One lakh tonnes will be handled by JCCI&E, Madras, and the Deputy Chief Controller of Imports and Exports, Jaipur, will give export licences for another one lakh tonnes.

The ceiling of five lakh tonnes will be operated on an annual basis. In case of failure on the part of exporters to complete the shipment of the allotted quantity, penal action will be taken against them, it is stated.

(The Economic Times 28 April 1991, 1)

227 Tea export from India

Tea exports from India during 1990-91 are estimated to have touched Rs. 1,045.41 crore against Rs. 862.45 crore during 1989-90.

The unit value realisation is also estimated to have risen to Rs. 52.59 per kg during 1990-91 from Rs. 43.18 per kg in 1989-90.

In terms of quantity, tea exports amounted to 199.48 million kg., against 202.81 million kg in 1989-90.

(Deccan Herald 16 May 1991, 15)

228 Bid to boost exports of fruits, vegetables

In its efforts to encourage export of fresh fruits and vegetables, the Centre has enhanced the entitlement for import replenishment licences on export of all types of fresh fruits and vegetables excluding onions and mushrooms.

According to the Agricultural and Processed Food Products Export Development Authority (APEDA), exporters of fresh fruits and vegetables will now be able to import replenishment licence of 15 per cent on the f.o.b value of their exports as against ten per cent allowed previously.

Necessary amendment in the import and export policy 1990-93 has been made by the Government through a notification on May 31.

APEDA said export of fresh fruits and vegetables, particularly to the West Asia and Gulf region would get a boost by this enhancement. (Financial Express 8 June 1991, 4)

Import

229 Cashew procurement

The Kerala State cashew workers apex industrial co-operative society, (Capex), the monopoly procurement agency for cashewnut in the State, is to import one lakh tonnes of cashew from Brazil, Tanzania and Kenya.

Capex could procure only 57,000 tonnes of cashew this year against the target of one lakh tonnes, an official press release said.

The society would also procure cashew from Andhra Pradesh, Goa and Tamil Nadu to meet shortfall in internal procurement. (Financial Express 9 June 1991, 1)

230 Almonds import

The government's attention has been drawn to a report published in a section of the press which said the recent decision to stop dry fruit imports including almonds was primarily aimed at stopping the exclusive contract with the US almond exporters.

An official release in Delhi said there are certain inaccuracies in the report. It is clarified that the Indo-US agreement on global imports of almonds continue to be valid and that abrogation of this agreement is not being contemplated by the Union Government.

This agreement does not provide the US with any exclusive advantage as there is neither tariff, nor any other preference for almonds originating in the US.

Licence holders are free to import almonds from the country of their choice. The suspension of import authorisation for dry fruits including almonds is for balance of payments reasons, it said. (Financial Express 17 May 1991, 1)

231 Palm oil import stopped

India has stopped import of palm oil from Malaysia following improved availability of indigenous edible oils. (Financial Express 21 April 1991, 1)

232 Import of edible oils

Year	Total Import (Lakh tonnes)	Value (Rs. Crores)	% change in Qty	% change in Value
1987-88	18.19	920	+ 10.6	+ 50.3
1988-89	8.50	650	- 53.3	- 29.3
1989-90(E)	10.00	800	+ 17.6	+ 23.1

(Productivity 31(4), 1991, 625)

233 Per cent of imported and indigenous oils used for vanaspathi manufacture

Oils Used	1987-88	1988-89	1989-90
Imported			
RBO Palmoil	1.5	-	-
Soyabean	31.0	2.7	-
Palm	8.6	1.6	-
Rapeseed	9.0	1.4	-
Palmolein	-	-	-
Sunflower	1.2	0.8	-
Other imported oils	7.3	4.7	3.9
Total % age	58.7	11.2	3.9
Indigenous			
Sesamum	5.9	5.7	5.1
Cotton seed	10.8	26.2	29.9
Soyabean	3.9	15.2	18.2
Sunflower	2.6	3.0	2.0
Rice Bran	13.5	14.4	16.5
Maize	0.3	0.5	0.4
Niger	0.7	0.6	0.3
Mahua	1.0	1.4	1.0
Watermelon	-	-	-
Safflower	-	-	-
Kardi	0.1	0.1	-
Mangokernal	-	-	-
Salseed	-	-	-
Mustard (Exp)	-	-	-
Mustard (SE)	2.3	10.8	10.4
RS Off. spec.	-	8.1	8.1
RBD Off spec	-	-	0.4
NPO Off spec	-	0.1	1.1
Palmolein	-	0.3	0.8
Off spec	-	-	0.2
SBO Off spec	-	-	-
Groundnut	-	-	-
Others	-	2.0	0.5
	-	0.3	1.1

*Compulsory use

(Productivity 31(4), 1991, 628)

Trade Information

234 Estimated demand for edible oils in India (1989-2000)

	Per Capita NNP as at 1980-81 prices)*	Estimated Per capita edible oil consumption (Kgs)**	Population*** (Million)	Total demand for edible oils (Million tonnes)
1997-98	2716	10.79	990	10.68
1998-99	2798	11.24	1010	11.35
1999-00	2882	11.71	1030	12.06

* Assumed to grow at the rate of 3 per cent per annum.

** Details of the estimation method are given in Annexure 1

*** Assumed to grow at the rate of 2 per cent per annum
(Productivity 31(4), 1991, 627)

235 Ban on using mustard oil in vanaspati

The Government banned use of expeller mustard oil from August 1 in the manufacture of vanaspati.

According to an official spokesman the industry has been advised to use whatever mustard oil they have with them or they have contracted for before today for manufacture till July 31.
(Deccan Herald 18 July 1991, 14)

236 Iced coffee

Four U.S. companies are joining forces to launch the first commercial iced coffee ever produced in the United States.

Jamaican Gold is an iced coffee which has been developed by the California company Bay Beverages. Joining Bay Beverages in the launch of iced coffee is Reynolds Metals Company of Richmond, Virginia, which is manufacturing the 12-ounce recyclable aluminium cans in which it will be sold. "We've been working jointly on this product for about two years and decided on the standard-size aluminium beverage can because consumers are so familiar with it," president Jack Bays noted. California-based Prince of Peace, Inc. is handling the marketing, while New York's White Rock Products Co. is the contract packer.
(Food Engineering International September 1990, 14)

237 New products from Rishabh food

Rishabh Food Products Ltd has launched two nutritive value snacks called Flips and Ruskies in New Delhi recently. The Flips is a low fat, high protein, cereal-based snack in peanut and masala flavours while Ruskies is a cereal-based snack. The company's plant is located at Mewat in Haryana. The Rs. 3.5-crore project was financed by the Haryana State Industrial Corporation, Haryana Financial Corporation and the State Bank of Patiala. The plant, set up with German technology, has an installed capacity of 1,200 tonnes per annum and can produce up to 5 tonnes per day. The company has provided direct employment to about 150 people.

(Chemical Products Finder 9(11), 1991, 132)

238 Investment limit for SSIs raised

The investment limit for the small-scale industries has been finally raised from Rs 35 lakh to Rs 60 lakh according to a notification issued by the Union government on April 2. The investment limit for the ancillary units has also been raised from Rs 45 lakh to Rs 75 lakh.

An extra incentive is being given to the small-scale industries that export. Their investment limit is further raised to Rs 75 lakh with the condition that they export at least 30 per cent of the entire output by the third of their starting production. The notification has already been gazetted (Gazette number, SO 232 (E) April 2). (The Economic Times 16 April 1991, 1)

239 Plant molecular biology centre

A Centre for Plant Molecular Biology (CPMB) will be set up at the National Botanical Research Institute (NBRI) at Lucknow to carry out research in the frontier areas of plant molecular biology. The Union Government has already sanctioned the project, to be set up at a cost of Rs. 2.09 crores.

Dr. P.V. Sane, Director, NBRI, has been designated as the principal coordinator and shall be overall in-charge of the centre, officials said at Lucknow recently. (Chemical Weekly 36(35), 1991, 65)

240 New cell in DGTD to boost technology

A new cell has been created in the office of the Director-General Technical Development (DGTD) to give a fresh impetus to development of indigenous technologies. The cell to be known as "indigenous evaluation cell" will interact with various research laboratories, institutions and industrial units to promote commercialisation of such technologies.

An advisory committee under the chairmanship of Dr G.S. Sidhu, former Director-General of Council of Scientific and Industrial Research (CSIR), has also been set up.
(The Economic Times 12 May 1991, 16)

241 US agency clears Tomco's neem-based pesticide

The Environment Protection Agency (EPA) of United States has approved a neem-based biological pesticide developed by Tata Oil Mills Company Ltd (Tomco) for use on a wide range of food crops.

The natural pesticide based on neem extracts underwent extensive field trials in the United States. It has been cleared for use on outdoor and greenhouse crops. Tomco has plans to set up a plant to manufacture the product on a commercial scale.

Neem extracts produced by various firms in India are under investigation in agricultural institutes in several western countries as well as the Soviet Union. Many agricultural universities in the United States have conducted studies on neem compounds and have established the efficacy of azadirachtin, the active ingredient in neem in fighting pests on a wide variety of vegetation. But this is the first occasion when a neem compound has been cleared by EPA. The stage is now set for use of the natural pesticide by farmers themselves.

(The Economic Times 22 April 1991, 16)

Food Regulation, Quality Control & Hygiene

242 Atomic Energy (Control of Irradiation of Food) Rules, 1990

G.S.R. 129 - In exercise of the powers conferred by Section 30 read with Section 14 and 17 of the Atomic Energy Act 1962 (Act 33 of 1962), the Central Government hereby makes the following rules, namely:-

1. Short title and commencement - (1) These rules may be called the Atomic Energy (Control of Irradiation of Food) Rules, 1990.
(2) They shall come into force on the date of their publication in the Official Gazette.

2. Definitions:- In these rules unless the context otherwise requires:

- (a) "Act" means the Atomic Energy Act, 1962 (33 of 1962);
- (b) "Applicant" means the person making an application for grant of licence;
- (c) "Certificate of approval" means the certificate of approval granted by the competent authority for operating an irradiation facility in accordance with Rule 5;
- (d) "Certificate of Irradiation" means the certificate of irradiation issued by the licensee under Rule 12;
- (e) "Certificate of release" means certificate of release issued under Rule 25;
- (f) "Competent Authority" means any officer or authority directed by the Central Government under Section 27 of the Act to exercise the powers or discharge the duties under these Rules;
- (g) "Dosimetry" means the method to measure the absorbed dose of radiation by the food;
- (h) "Food" means article of food referred to in column 2 of Schedule I;
- (i) "Form" means the form annexed to these Rules;
- (j) "Inspection report" means the inspection report referred to in Rule 10.
- (k) "Irradiation facility" means any facility which is capable of being utilised for the treatment of food by radiation.
- (l) "Irradiated Food" means articles of food subjected to radiation by -
 - (i) Gamma rays;
 - (ii) X-rays generated from machine sources operated at or below an energy level of 5 million electron volts and
 - (iii) Sub-atomic particles namely electrons generated from machine sources operated at or below an energy level of 10 Million electron volts, to dose levels as specified in Schedule I.
- (m) "Licence" means licence for operating an irradiation facility issued under Rule 4;
- (n) "Licensee" means the person named in the licence in whose favour the licence is issued;
- (o) "Licensing authority" means the Central Government or any officer or authority empowered by notification under Section 27 of the Act to grant licences under Section 14 of the Act;
- (p) "Operational limits" shall have same meaning as assigned in Clause (h) of Rule 2 of the Radiation Protection Rules;
- (q) "Operator" means any person appointed as such by the licensee and who satisfies the qualification and requirements specified in paragraph 2 of Schedule II.
- (r) "Quality Control Officer" means any person appointed as such by the licensee and who satisfies the qualification and requirements specified in paragraph 3 of Schedule II;
- (s) "Radiation Protection Rules" means the Radiation Protection Rules, 1971 published with the notification of Government of India in the Department of Atomic Energy in No. GSR 1601 dated 13th September 1971.
- (t) "Radiological Safety Officer" means any person appointed as such by the licensee and who satisfies the qualification and requirements specified in paragraph 1 of Schedule II;

(u) "Record of Irradiated Food" means the record of irradiated food required to be maintained by the licensee under Rule 11;

(v) "Schedule" means schedule to these rules;

(w) Words and expressions used herein but not defined shall have the meaning assigned to them in the Radiation Protection Rules.

3. Conditions precedent for the issue of a licence:- No licence for operating irradiation facility shall be granted unless the applicant obtains a certificate of approval from the competent authority to the effect that the facility is in conformity with the general conditions for design, operation and control specified in Schedule III and safety and efficiency criteria specified in Schedule IV.

4. Licence:- (1) Every application for a licence shall be made to the licensing authority in Form I and shall be accompanied by:-

(a) a certificate of approval;

(b) fee of Rupees Five Hundred payable in the form of a bank draft drawn in favour of the licensing authority;

(2) If the licensing authority is satisfied that the applicant is capable of operating an irradiation facility in accordance with these rules, it may issue a licence in Form IV.

(3) If the licensing authority is satisfied that the applicant is not capable of operating an irradiation facility in accordance with these rules, it may, after giving the applicant reasonable opportunity of being heard against the proposed refusal of licence, by order, setting out the reasons therein, refuse to grant the licence.

(4) Every order refusing to grant the licence under sub-rule (3) shall be communicated to the applicant, by sending a copy of the order by registered post to the address given in the application.

5. Certificate of approval: - (1) Every application for a certificate of approval shall be made to the competent authority in Form III.

(2) If the competent authority is satisfied that the applicant satisfies the requirements specified in Schedule III and IV, it shall grant a certificate of approval in Form II.

(3) If the competent authority is satisfied that the applicant does not satisfy the requirements specified in Schedules III and IV, it may, after giving the applicant a reasonable opportunity of being heard against the proposed refusal of the certificate of approval, by order, setting out the reasons therein, refuse to grant the certificate of approval.

(4) Every order refusing to grant the certificate of approval under Sub-rule (3) shall be communicated to the applicant by sending a copy of the order by registered post to the address given in the application.

6. Power to suspend the certificate of approval:- (1) If the competent authority is satisfied, on the basis of the inspection report, that any irradiation facility has ceased to conform to the safety and efficiency criteria specified in Schedule III and IV, it may for reasons to be recorded in writing, make an order suspending the certificate of approval and call upon the licensee to rectify the defects mentioned therein within a period of thirty days from the date of receipt of the order.

(2) The order of the competent authority made under Sub-rule (1) along with the copy of the inspection report shall be communicated to the licensee, who shall on receipt of the same, cease to operate the irradiation facility until the suspension of the certificate of approval is revoked under Sub-rule (5).

(3) The competent authority shall transmit copies of the order and inspection report referred to in Sub-rule (2) to the licensing authority.

(4) The competent authority shall enter in the certificate of approval particulars of the inspection.

(5) Where the competent authority is satisfied that pursuant to the order made under Sub-rule (1) the licensee has rectified the defects mentioned therein, it may revoke the suspension of the certificate of approval and communicate the decision to the licensee.

(6) If the defects mentioned in the order are not rectified by the licensee within the period mentioned therein, the competent authority shall report the matter to the licensing authority for necessary action.

7. Power to suspend the licence:- (1) If the licensing authority is satisfied on the basis of the inspection report that the licensee has failed to ensure that the irradiation facility under his control conforms to the safety and efficiency criteria specified in Schedule III and IV, it may for reasons to be recorded in writing make an order suspending the licence and call upon the licensee to rectify the defects mentioned therein within a period of twenty days from the date of receipt of the order.

(2) The order made by the licensing authority under Sub-rule (1) along with the copy of the inspection report shall be communicated to the licensee, who shall on receipt of the same, cease to operate the irradiation facility until the suspension of the licence is revoked under Sub-rule (3).

(3) Where the licensing authority is satisfied that pursuant to the order made under Sub-rule (1), the licensee has rectified the defects mentioned therein, it may revoke the suspension of the licence and communicate the decision to the licensee.

8. Revocation of licence:- Notwithstanding with anything contained in Rule 4, the licensing authority may, after giving the licensee a reasonable opportunity of being heard, by order setting out

the reasons therein, revoke any licence or modify the terms and conditions of any licence on any of the following grounds:-

- (1) Where the certificate of approval has been suspended and the competent authority has reported that the licensee has not rectified the defects mentioned in the order of suspension within the period stipulated therein; or
- (2) Where the licence has been suspended and the licensee has not rectified the defects mentioned in the order of suspension within the period stipulated therein; or
- (3) Where in the opinion of the licensing authority it is necessary to do so in public interest.

9. Conditions for irradiation of food:- (1) The licensee shall not undertake irradiation of any food unless in his opinion such irradiation is necessary for its preservation, protection against parasites or improvement of its hygienic or technological quality.

(2) The licensee shall ensure that:-

- (a) the Quality Control Officer has satisfied himself that the food to be irradiated is of good quality;
- (b) in the case of packaged products the packing material conforms to the standards specified in the Schedule VIII.
- (c) the irradiated food is readily identified so as to prevent it from being subjected to subsequent irradiation.
- (d) the dose limit, radiation source and irradiation conforms to the conditions specified in Schedules I and V;
- (e) the irradiation facility is operated only by the operator.

10. Periodic Inspection of facilities:- (1) The competent authority shall undertake inspection of each irradiation facilities atleast twice a year.

(2) The particulars of the inspection shall be recorded by an entry on the certificate of approval.

(3) A copy each of the inspection report shall be forwarded to the licensee and to the licensing authority.

11. Record of food irradiation:- (1) The licensee shall maintain, for each source of radiation used, a record in Form V indicating for each batch of food subjected to radiation treatment:-

- (a) the serial number of the batch;
- (b) the date of irradiation;
- (c) the nature and quality of irradiated food and the batch number;
- (d) the type of packaging used during the radiation treatment in the case of packaged products;
- (e) the control and measurement performed during the treatment, particularly as regards the minimum and maximum limits of radiation dose;
- (f) where appropriate, all supplementary information required by the specific irradiation conditions provided for in Schedule V;
- (g) any incidents and anomalies observed during the irradiation treatment.

(2) The record shall contain the names and address of the operators and the quality control officer and the identification number of the irradiation facility.

(3) The licensee shall retain the records for a period of five years.

(4) The licensee shall maintain the record of standard model for the food irradiation in respect of each batch of food as specified in Form V.

12. Certificate of irradiation:- (1) The licensee shall, on the basis of the data entered in the record of irradiated food, issue a certificate for every batch of food item which has undergone irradiation in his facility.

(2) A copy of the certificate of irradiation shall be maintained by the licensee.

13. Irradiation voucher:- The licensee shall issue to the person from whom an order for the irradiation of food has been received, an irradiation voucher for each batch of food containing the following particulars, namely,

- (1) the identification number of the irradiation facility together with the names and addresses of the operator and quality control officer;
- (2) The nature and quality of the batch of irradiated food and also the purpose of the irradiation;
- (3) The date of the radiation treatment;
- (4) The radiation source used and specific dose of radiation;

(5) The serial number of the batch which has been subjected to the treatment which number must correspond to the information in the irradiation record; and

(6) Date and signature of the licensee.

14. Maintenance of log books:- Every licensee shall maintain and make available to any person duly authorised by the competent authority for inspection, a log book containing the following particulars, namely:-

- (1) description of the facility;
- (2) source details;
- (3) the name of supplier of the source and his address;
- (4) the identity of the Radiological Safety Officer (RSO).

15. Control of irradiation facility:- (1) The competent authority shall undertake verification to ensure that the operation of the facility and the use of radiation treatment procedures conform to the general and specific conditions provided in Schedules III and IV.

(2) The licensee shall provide all reasonable facilities to the competent authority or any person authorised by it, to carry out inspection and measurement procedures as may be necessary.

16. Powers and duties of persons authorised to inspect:- (1) The competent authority or any person authorised in this behalf shall -

(a) have right of access:-

- (i) to any place which is used for irradiation of food or for storage of food which has been or has to be irradiated;
- (ii) to all documents relating to the irradiation facility, the batches of food which have been or are to be irradiated, a certificate of approval, the copies of the inspection report, order of suspension, modification or revocation of licence, food irradiation records and the documents relating to purchase and sale accompanying the batches of food;

(b) check the performance of the irradiation unit and measure the dosage to which the food is subjected to.

17. Radiological Safety Officer:- No person shall be appointed as a Radiological Safety Officer unless such person -

- (1) possesses a certificate towards his qualification by an institution or authority approved by the competent authority.
- (2) is familiar with the operating and emergency procedures of the irradiation unit and has demonstrated his understanding thereof to the satisfaction of the competent authority.
- (3) is familiar with the Rules, notifications and orders applicable to the irradiation facility and has demonstrated his understanding thereof to the satisfaction of the competent authority.
- (4) has demonstrated to the satisfaction of the competent authority competence to use the irradiation facility and the radiation instruments to be used in his assignments.

18. Duties of Radiological Safety Officer:- The Radiological Safety Officer shall -

- (1) instruct the radiation workers under his charge on the hazards of radiation and on suitable safety measures and work practices aimed at minimising exposure to radiation;
- (2) take all necessary steps aimed at ensuring that the operational limits are not exceeded;
- (3) carry out leakage tests as specified in the Radiation Protection Rules 1971 and tests of safety related systems;
- (4) investigate and initiate prompt and suitable remedial measures in respect of any situation that could result in radiation hazard;
- (5) ensure that reports on all hazardous situation along with the details of any immediate remedial measures that may have been initiated, are made available immediately to his employer;
- (6) assist the licensee in the safe disposal of decayed radioactive sources in a manner approved by competent authority.

19. Monitoring of personnel:- The licensee shall ensure that-

- (1) Every person entering the irradiation facility wears separate personnel monitoring device provided by him.
- (2) Such personnel monitoring devices are processed by an agency approved the the competent authority.
- (3) Investigation reports regarding all excessive exposures are forwarded to the competent authority.

(4) The workers exposed to radiation are subjected to medical examination as provided in Radiation Protection Rules.

20. Operating Procedures:- The licensee shall prepare a detailed operating procedure based on the manufacture's manual which shall inter alia provide that:-

(1) the irradiation facility shall be operated only in such a way that no person is likely to be exposed to radiation doses in excess of the operational limits notified by the competent authority.

(2) it shall be impossible to resume operation of irradiation facility after the return of the source to the fully shielded position without complying with the requirements such as interlocked controls for personnel access, radiation room lock-up sequence and source exposing operations.

(3) a single multipurpose key which is to operate the control console, to gain access to the radiation room and to activate appropriate interlocks is available.

(4) the procedures and occasions for conducting radiation surveys and contamination tests are devised.

(5) the procedures for locking and securing the facility are available.

(6) monitoring of the personnel and the use of area monitoring equipment is made mandatory.

(7) transportation of sealed sources used in irradiation unit is undertaken in a safe manner.

(8) records are maintained in proper form.

(9) for inspection and maintenance of the radiation facility appropriate procedures are devised.

(10) in the event of an accident persons to be notified in accordance with appropriate procedure.

(11) the radiation zone monitor is so integrated with the personnel access door interlocks to prevent room access of specified values or if the detector malfunctions or is turned off.

(12) the monitor shall also generate audible and visible alarm signals if the radiation level exceeds that when source is in the fully shielded position.

21. Emergency procedures:- (1) The licensee shall prepare detailed emergency procedures for each type of emergency that may reasonable be anticipated.

(2) The procedure should be brief and should be expressed in the form of instructions which can be understood by non-technical persons.

(3) The procedures should describe situations requiring emergency action and specify immediate action to be taken to minimise radiation dose to persons in the vicinity of the irradiation facility.

22. Security of irradiation facility:- The licensee shall ensure that during the operation of the irradiation facility direct surveillance of the facility is maintained in order to prevent unauthorised entry into the facility.

23. Posting of radiation warning signs:- The licensee shall conspicuously display at the site in which irradiation is in progress the radiation warning signs specified in Rule 17 of the Radiation Protection Rules.

24. Radiation survey instruments:- The licensee shall not commence operation of any irradiation facility under his control unless the irradiation facility is equipped with instruments specified by the competent authority as in Schedule VI.

25. Decommissioning:- (1) No licensee shall decommission any irradiation facility under his control unless he -

- (a) obtains the previous permission of the licensing authority;
- (b) undertakes to decommission the irradiation facility in the manner specified by the competent authority;
- (c) undertakes to bear all the expenses of such decommissioning

(2) The licensee shall not use the site used for the irradiation facility, for any other purpose, unless he obtains the certificate of release from the licensing authority.

(3) The licensing authority may on the application of the licensee and after obtaining a report from the competent authority, in its discretion issue a certificate of release.

26. Disposal of decayed source:- The licensee shall at his expense, ensure the safe disposal of the radioactive sources in such manner as may be approved by the competent authority.

[No. AEA/17/1/90-FR]
M.K. LOKESH, Dy.Secy.

SCHEDULE I
[See rule 21(h) and 9(2)(d)]

TECHNOLOGICAL CONDITIONS FOR IRRADIATION

S.No.	Name of Food	Purpose of Irradiation	Dose(kGy)			
			Minimum	Maximum	Overall average	Specific conditions
1	2	3	4	5	6	7
1.	Onions	To inhibit sprouting	0.03 (30 Gy)	0.09 (90 Gy)	0.06 (60 Gy)	-
2.	Frozen sea-foods	To reduce the number of certain pathogenic micro-organisms such as Salmonella in packaged frozen sea-foods.	4	6	5	Irradiation should be carried out in a frozen state
3.	Spices	To control insect infestation to reduce microbial load and pathogenic micro-organisms	6	14	10	Irradiation under pre-packed condition

SCHEDULE II
[See rule 2 (q), (r), (t)]
QUALIFICATIONS OF PERSONNEL

1. Radiological Safety Officer:- The minimum qualification - He should be a science graduate with physics as one of the subjects.

He should have also successfully undergone instructions specified for the training of Radiological Safety Officer. He should have also successfully undergone instructions specified for the training of Radiological Safety Officer level III as prescribed by the Atomic Energy Regulatory Board and should possess a valid Certificate to that effect. The subject for instructions include fundamentals of radiation and radiation protection, concept of dose limit, use of instruments and survey techniques in radiation detection; and knowledge of personnel monitoring equipments, inspection and maintenance of safety interlocks, and operation and emergency procedures.

2. Operator:- The operator should be Science graduate/Diploma holder either Electrical or Mechanical Engineering.

The subject for inclusion in the instruction of the operator will be the same as those prescribed for Radiological Safety Officer except that he shall be given training in elements of food technology and food irradiation technology also.

(1) Food Irradiation Technology:

- (a) Details of radiation sources used for food irradiation.
- (b) Measurement of absorbed doses during irradiation using proper dosimeter for various types of sources and maintenance of the record of dosimetry and source activity.
- (c) Source-product geometry to increase efficiency of radiation utilization.
- (d) Operation of radionuclide irradiator to ensure correct operational and of correct safe positions of the source which should be interlocked with the product movement.
- (e) Maintenance of irradiator.
- (f) Irradiation technology of individual food items.

3. Quality Control Officer:- The qualification of the Quality Control Officer should be either M.Sc./B.Tech. in Microbiology, Food Technology or Food Chemistry.

- (1) The Quality Control Officer shall ascertain the quality of the food.

SCHEDULE III
[See rule (3)]

General conditions for the approval of Irradiation Facilities.

The applicant shall submit to the Competent Authority:

- (1) The complete design drawings of the facility indicating the details of the shielding surrounding the source, wall thickness, labyrinth access, openings, voids, reinforcements, mechanical and electrical safety system, ventilation, fire protection systems.
- (2) The environs of the facility including residential complexes, occupancy within 50m radius of the facility, geology of the location, water table, soil characteristics, seismicity.
- (3) Complete description of the radiation source, address of the supplier and the operating condition of the source such as source drive system.
- (4) Safety analysis report to demonstrate the adequacy of radiation safety under normal and anticipated accident conditions.

SCHEDULE IV

[See rule 3]

A. CODE OF PRACTICE FOR THE OPERATION OF IRRADIATION FACILITIES

1. Introduction

1.1 Only irradiation facilities based on the use of either a radionuclide source (^{60}Co or ^{137}Cs) or X-rays and electrons generated from machine sources should be used.

1.2 The irradiation facility may be of two designs either "continuous" or "batch" type.

1.3 The irradiation facility shall make use of accepted methods for measuring the absorbed radiation dose and of the monitoring of the physical parameters of the process.

2. Irradiation Plants

2.1 The manufacturer of the facility should state the activity of the source in Becquerel (Bq) in the case of radionuclide source, and it should be recorded. The recorded activity should take into account the natural decay rate of the source and should be accompanied by a record of the date of measurement or recalculation.

2.2 The irradiation facility using radionuclide sources shall have a well separated and shielded depository for the source element and a treatment area which can be entered only when the source is in the safe position.

2.3 There should be a positive indication of the correct operational and of the correct safe position of the same which should be interlocked with the product movement system.

2.4 In the case of machine sources the average beam power should be adequately recorded.

2.5 There should be a positive indication of the correct setting of all machine parameters which should be inter-locked with the product movement system.

2.6 A beam scanner or a scattering device (e.g. the converting target) must be incorporated in a machine source to obtain an even distribution of the radiation over the surface of the product.

2.7 The product movement, with width and speed of the scan and the beam pulse frequency (if applicable) should be adjusted to ensure a uniform surface dose.

3. Dosimetry and Process Control

3.1 Certain dosimetry measurements (Para B) should be made prior to the irradiation of any food stuff.

3.2 The dosimetry measurement should be done for each new food irradiated, irradiation process, and whenever modifications are made to source strength or type and to the source product geometry.

3.3 Routine dosimetry should be made during operation and records of such measurements must be available for inspection.

3.4 The measurements of facility parameters governing the process such as transportation speed, dwell time, source exposure time, machine beam parameters, should be made regularly during the operation and record must be kept for inspection.

4. Good radiation processing practice

4.1 The design of the irradiator should have the facility to optimize the dose uniformity ratio to ensure appropriate dose rates and where necessary to permit temperature control during irradiation (e.g. for treatment of frozen food) and also control of atmosphere.

4.2 Care must be exercised to minimize mechanical damage to the product during transport, irradiation and storage and to use irradiator to its maximum efficiency.

4.3 Where the food to be irradiated is subjected to special standards for hygiene or temperature, control, the facility must permit compliance with these standards.

5. Product and Inventory Control

5.1 The incoming product should be physically separated from the outgoing irradiated product.

5.2 Where appropriate, a visual colour change radiation indicator should be affixed to each product pack for ready identification of irradiated and non-irradiated products.

5.3 Records should be kept in the facility record book which show the nature and kind of the product being treated, its identifying marks if packed or, if not, the shipping details, its bulk density, the type of source or electron machine the dosimetry, the dosimeters used and details of their calibration, and the dates of the treatment.

5.4 All products shall be handled, before and after irradiation, according to accepted good manufacturing practice taking into account of the particular requirements of the technology or the process (Schedule I). Suitable facilities for refrigerated storage may be required.

B. DOSIMETRY

1. The overall average absorbed dose

It can be assumed for the purpose of the determination of the wholesomeness of food treated with an overall average dose of 10 KGy or less, that all radiation chemical effects in that particular dose range are proportional to dose.

The overall average dose D , is defined by the following integral over the total volume of the goods

$$D = \frac{1}{M} \int p(x,y,z) \cdot d(x,y,z) \cdot dV$$

where

M = the total mass of the treated sample

p = the local density at the point (x,y,z)

d = the local absorbed dose at the point (x,y,z)

$dV = dx \, dy \, dz$ the infinitesimal volume element which in real cases is represented by the volume fractions.

The overall average absorbed dose can be determined directly by homogeneous products or for bulk goods of homogeneous bulk density by distributing an adequate number of dose meters strategically and at random throughout the volume of the goods. From the dose distribution determined in this manner an average can be calculated which is the overall average absorbed dose.

If the shape of the dose distribution curve through the product is well determined the positions of minimum and maximum dose are known. Measurements of the distribution of dose in these two positions in a series of samples of the product can be used to give an estimate of the overall average dose.

In some cases the mean value of the average values of the minimum (D_{min}) and (D_{max}) dose will be a good estimate of the over all average dose, i.e. in these cases

$$\text{overall average dose} = \frac{\bar{D}_{max} + \bar{D}_{min}}{2}$$

2. Effective and limiting dose values

Some effective treatment e.g. the elimination of harmful microorganisms, or a particular shelflife extension, or a disinfestation requires a minimum absorbed dose. For other applications too high an absorbed dose may cause undesirable effects or an impairment of the quality of the product.

The design of the facility and the operational parameters have to take into account minimum and maximum dose values required by the process. In some low dose applications it will be possible within the terms of section 4 on Good Radiation Processing Practice to allow a ratio of maximum to minimum dose of greater than 3.

With regards to the maximum dose value under acceptable wholesomeness considerations and because of the statistical distribution of the dose of mass fraction of product of at least 97.5% should receive an absorbed dose of less than 15 KGy when the overall average dose is 10 KGy.

3. Routine dosimetry

Measurements of the dose in a reference position can be made occasionally throughout the process. The association between the dose in the reference position and the overall average dose must be known. These measurements should be used to ensure the correct operation of the process. A recognised and calibrated system of dosimetry should be used.

A complete record of all dosimetry measurements including calibration must be kept.

4. Process control

In the case of a continuous irradiation facility employing radionuclide, it will be possible to make automatically a record of transportation speed or dwell time together with indications of source and product positioning. These measurements can be used to provide a continuous control of the process in support of routine dosimetry measurements.

In a batch operated radionuclide facility automatic recording of source exposure time can be made and a record of product movement and placement can be kept to provide a control of the process in support of routine dosimetry measurements.

In a machine facility a continuous record of beam parameters, e.g., voltage, current, scan speed, scan width, pulse repetition and a record of transportation speed through the beam can be used to provide a continuous control of the process in support of routine dosimetry measurements.

SCHEDULE V

[See Rule 9(2)(d)]

GENERAL STANDARD OF IRRADIATED FOODS

1. SCOPE

This standard applies to foods processed by irradiation. It does not apply to foods exposed to doses imparted by measuring instruments used for inspection purposes.

2. GENERAL REQUIREMENTS FOR THE PROCESS

2.1 Radiation Source

The following types of ionizing radiation may be used:

- (a) Gamma rays from the radionuclides ^{60}Co or ^{137}Cs ;
- (b) X-rays generated from machine sources operated at or below an energy level of 5 MeV;

- (c) Electrons generated from machine sources operated at or below an energy level of 10 MeV.

2.2 Absorbed Dose

The overall average dose absorbed by a food subjected to radiation processing should not exceed 10 KGy.

2.3 Facility and Control of the Process

2.3.1 Radiation treatment of food shall be carried out in facilities licensed and registered for this purpose by the competent national authority.

2.3.2 The facilities shall be designed to meet the requirements of safety, efficacy and good hygienic practices of food processing.

2.3.3 The facilities shall be staffed by adequate, trained and competent personnel.

2.3.4 Control of the process within the facility shall include the keeping of adequate records including quantitative dosimetry.

2.3.5 Premises and records shall be open to inspection by appropriate national authorities.

3. TECHNOLOGICAL REQUIREMENTS

3.1 Conditions for Irradiation

The irradiation of food is justified only when it fulfils a technological need.

3.2 Food Quality and Packaging Requirements

The doses applied shall be commensurate with technological and public health purposes to be achieved and shall be in accordance with good radiation processing practice. Foods to be irradiated and their packaging materials shall be of suitable quality, acceptable hygienic condition and appropriate for this purpose and shall be handled, before and after irradiation, according to good manufacturing practices taking into account the particular requirements of the technology of the process.

4. LABELLING

4.1 Inventory Control

For irradiated foods, whether prepacked or not, the relevant shipping documents shall give appropriate information to identify the registered facility which has irradiated the food, the date(s) of treatment and lot identification.

4.2 Prepacked foods intended for direct consumption

The labelling of prepacked irradiated foods shall be in accordance with the relevant provisions given in Prevention of Food Adulteration Rules.

4.3 Food in bulk containers

The declaration of the fact of irradiation shall be made clear on the relevant shipping documents.

5. RE-IRRADIATION

5.1 Except for foods with low moisture content (cereals, pulses, dehydrated foods and other such commodities irradiated for the purpose of controlling insect reinfestation, foods irradiated in accordance with 2 and 3 of this standard shall not be re-irradiated.

5.2 For the purpose of this standard food is not considered as having re-irradiated when, (a) the food prepared from materials which have been irradiated at low levels e.g. about 1 kGy, is irradiated for another technological purpose, (b) the food, containing less than 5 per cent of irradiated ingredient is irradiated, or when (c) the full dose of ionizing radiation required to achieve the desired effect is applied to the food in more than one instalment as part of processing for a specific technological purpose.

5.3 The cumulative overall average dose absorbed should not exceed 10 KGy as a result of re-irradiation.

SCHEDULE VI

(See Rule 24)

RADIATION SURVEY INSTRUMENTS REQUIRED FOR RADIATION MONITORING

Either

A. (i) Radiation Survey Meter (G.M. Type 0-2-mR/hr. or with other appropriate measurement range)

and

(ii) Radiation survey Meter (ionization chamber type 0-5R/hr. or with other appropriate measurement range).

or

B. Wide Range Survey Meter (G.M. Type 0-100R/hr. or with other appropriate measurement range). Alternatively, any single or combination of radiation survey meters recognised by the Competent Authority as equivalent to the above.

SCHEDULE VII

[See Rule 9 (2) (b)]

PACKAGING CONDITIONS FOR IRRADIATION

Where packing is essential to prevent post-treatment recontamination, the food should be packaged before treatment.

Package size especially with bulk packs should be such that they can be handled efficiently thereby avoiding excessive delays and temperature abuse.

The choice of the packing material and the nature of the container for specific food is usually determined by the purpose they are to serve and storage conditions, such as prevention of moisture loss or moisture uptake, to provide an atmosphere devoid of air, or to avoid mechanical damage to food.

Sterilized food must have containers which prevent access to bacteria or other microorganisms.

Rigid containers: Primary rigid container used for irradiated food is metal can. Steel containers, tin-plated and lined with appropriate enamel such as polybutadiene or epoxy-phenolic have been found to be satisfactory.

Secondary rigid containers made of wood, fibre board or glass are also used.

Flexible packaging material : Flexible plastic containers because of their low density are highly suitable for packing irradiated food. Films over 75 μm thick are satisfactory for preservation of irradiated products. In case laminates are used for their performance should satisfy the following criteria.

The films are not change adversely, -

- (a) in their protective characteristics (e.g. seal stability, permeability, etc).
- (b) by radiation induced changes in the food.
- (c) causing transmission of toxic or potentially toxic, and substances to the food.

Polymeric films recommended for use upto 10 KGy are:

- Nitrocellulose or vinylidene coated cellophane
- Wax coated paper board
- Glassine paper
- Polystyrene
- Rubber hydrochloride
- Vinylidene chloride - vinyl chloride
- Polyethylene

- Polyethylene terephthalate
- Nylon 6
- Nylon 11
- Vinyl chloride - vinyl acetate
- Vegetable parchment

FORM I

[See Rule 4(1)]

Government of India

Department of Atomic Energy

APPLICATION FOR OBTAINING A LICENCE FOR AN IRRADIATION FACILITY

1. Name of the applicant :
2. Address of the applicant :
3. Installation for which approval is applied for :
4. Name and designation of the Head of Installation :
5. Names, qualifications and experience of Personnel :

Category of Personnel	Name	Academic Qualification	Type of Training experience	When and where trained	Duration of Training
Operator					
Radiological					
Safety Officer					
Quality Control Officer					
6. Proposed date of starting the irradiation facility:	Name of radionuclides		Activity		
7. Details about the Irradiation Facility:	Radiation generating plant		Energy	Output	
	X-ray nit				
	Electron Accelerator				

- (1) Identification number of the facility
- (2) Location and address
- (3) Source details
- (4) Name of the supplier and his address
- (5) Purpose for which the irradiation facility will be used.

8. Please attach the following additional information to the application:

(1) A site plan (1:500 scale or as appropriate) of the installation indicating the location of buildings including residential complexes.

(2) Architectural blue prints (appropriate scale) showing layout of equipments.

- of
- (3) Complete design drawing of the facility including details
 - (4) Description of the organisational structure including delegation of authority and responsibility for operations at the facility.

9. Please indicate as appropriate

- (a) the irradiation facility is yet to be built
- (b) the irradiation facility is already built and equipped
- (c) Existing irradiation facility is to be modified as per details enclosed.

10. I hereby certify that :

(a) all the statements made above are correct to the best of my knowledge and belief.

(b) no operations will be carried out for purposes other than those specified under item 7(5) of this form.

(c) all provisions of the Atomic Energy (Control of Irradiation of Food) Rules, 1990, shall be strictly complied with.

(d) the irradiation facility shall not be transferred/sold/rented by me/us to another without the prior permission of the competent authority.

(e) no radiation source for the irradiation unit will be transported without the prior permission of the competent authority.

(f) full facilities will be accorded by me/us to any authorized representatives of the competent authority or the licensing authority to inspect the installations at any time.

(g) radiation surveillance and medical surveillance of all persons engaged in radiation work as required by the competent authority will be duly carried out at my/our expense.

(h) all recommendations that may be made from time to time by the competent authority in respect of radiation safety measures will be duly implemented.

(i) duly qualified/experienced radiological safety Officers/quality Officers will be appointed before the commencement of the operation of the facility.

(j) any changes in the personnel listed in this application will be intimated forthwith to the licensing authority and the competent authority.

(k) the rules regarding decommissioning, disposal of decayed sources and reuse of the site of the decommissioned facility will be strictly complied with.

Date:

Signature of the Applicant
Institution and Seal.

FORM II

[See rule 5(2)]

CERTIFICATE OF APPROVAL FOR IRRADIATION FACILITY

Mr./Messrs.....
of.....
.....
.....
having complied with the conditions prescribed in the Atomic Energy (control of irradiation of food) rules, 1990, for the approval of the irradiation facility is/are hereby granted the certificate if approval for his/their irradiation facility

The description of the irradiation facility and other details are shown as under:

1. Identification Number
2. Name and Addresses
 - (i) Licensee
 - (ii) Radiological Safety Officer
 - (iii) Quality Control Officer
 - (iv) Operator
3. Kind and nature of the food product to be irradiated
4. Radiation source used
 - (a) Type of Source
 - (b) Total activity content in the case of radionuclide source
 - (c) Type of operation
 - Batch
 - Continuous
 - (d) Source product geometry
 - (e) Dose rate
5. Specific operation conditions

COMPETENT AUTHORITY
(Seal of Office)

FORM III

[See rule 5(1)]

Government of India
DEPARTMENT OF ATOMIC ENERGY

APPLICATION FOR OBTAINING THE CERTIFICATE OF APPROVAL FOR AN
IRRADIATION FACILITY

1. Name of the applicant :
2. Address of the applicant :
3. Institution for which approval is applied for :
4. Names, qualification and experience of Personnel :

Catetory of Perso- nnel	Name	Academic Qualifica- tion	Type of training experien- ce	When and where trained	Duration of train- ing
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Operator

Radiological
Safety Officer

Quality Control
Officer

6. Proposed date of starting the irradiation facility
7. Are the personnel provided with facilities for
 - (a) Personnel dose monitoring
 - (b) Medical Surveillance

8. Details about the Irradiation Facility
 - (1) Identification number of the facility
 - (2) Location and its address
 - (3) Source detail

Name of radionuclides	Activity
-----------------------	----------

Radiation generating plant	Energy	Output
X-ray unit		
Electron Accelerator		

- (4) Name of the supplier and his address
- (5) Purpose for which the irradiation facility will be used.

Please furnish the following:

1. A site plan (1 : 500 scale or as appropriate) of the installation indicating the location of buildings including residential complexes, Occupancy within 50 metres radius of the facility.

2. Architectural blue prints (appropriate scale) showing layout of equipment.

3. Details on geology of the location, water table, soil characteristics, seismicity.

4. Complete design drawing of the facility including details of shielding surrounding the source, wall thickness and labyrinth access if applicable; openings, voids, reinforcements, mechanical and electrical safety systems, ventilation, fire protection systems.

5. Source movement system (where appropriate)

6. Safety analysis report to demonstrate the adequacy of radiation safety under normal and anticipated accident conditions as detailed in rules 20 and 21.

7. Operating and emergency procedures

8. List of calibrated radiation monitoring equipment in working condition.

9. Description of the organisational structure including delegation of authority and responsibility for operation of the facility.

10. Any other information which the competent authority may deem necessary to assess the safety status of the irradiation facility.

11. Please indicate as appropriate :

(a) the irradiation facility is yet to be built

(b) the irradiation facility is already built and equipped

(c) existing irradiation facility is to be modified as per details enclosed.

12. I hereby certify that :

(a) all the statements made above are correct to the best of my knowledge and belief.

(b) no operations will be carried out for purposes other than those specified under item 8(5) of this form.

(c) all provisions of the Atomic Energy (Control of irradiation of food) rules, 1990, shall be strictly complied with.

(d) the irradiation facility shall not be transferred/sold/rented by me/us to another without the prior permission of the competent authority.

(e) no radiation source for the irradiation unit will be transported without the prior permission of the competent authority.

(f) full facilities will be accorded by me/us to any authorised representatives of the competent authority or the licensing authority to inspect the installations at any time.

(g) radiation surveillance and medical surveillance of all persons engaged in radiation work as required by the competent authority will be duly carried out at my/our expense.

(h) all recommendations that may be made from time to time by the competent authority in respect of radiation safety measures will be duly implemented.

(i) duly qualified/experienced radiological safety officers/operators/quality officers will be appointed before the commencement of the operation of the facility.

(j) the rules regarding decommissioning, disposal of decayed sources and reuse of the site of the decommissioned facility will be strictly complied with.

Date:

Signature of the Applicant
Seal of the Institution

FORM IV

[See Rule 4(2)]

LICENCE FOR OPERATING AN IRRADIATION FACILITY

Mr./Messrs.....
of.....
.....
.....
having undertaken to comply with all the conditions prescribed in the Atomic Energy (Control of Food Irradiation) Rules, 1990 after having paid the prescribed licence fee and having obtained the certificate of approval from the Competent Authority is/are hereby authorised to commission and operate the irradiation facility described in the application for licence.

This licence is issued on.....and shall be valid upto.....subject to the conditions printed overleaf.

Licensing Authority
Seal of Office

CONDITIONS OF LICENCE

(a) This licence may be suspended or cancelled if any declaration made or information given in the application is found to be false or if any undertaking given in such application is not carried out.

(b) No operations will be carried out for purposes other than those specified under item 7(5) of the application for the licence and item 8(5) of the application for the certificate of approval.

(c) All provisions of the Atomic Energy (Control of Irradiation of Food) Rules, 1990, shall be strictly complied with.

(d) The irradiation facility shall not be transferred/sold/rented by me/us to another without the prior permission of the competent authority.

(e) No radiation source for the irradiation unit will be transported without the prior permission of the competent authority.

(f) Full facilities will be accorded by me/us to any authorised representatives of the competent authority or the licensing authority to inspect the installations at any time.

(g) Radiation surveillance and medical surveillance of all persons engaged in radiation work as required by the competent authority will be duly carried out at my/our expense.

(h) All recommendations that may be made from time to time by the competent authority in respect of radiation safety measures will be duly implemented.

(i) Duly qualified/experienced radiological safety officers/operators/quality officers will be appointed before the commencement of the operation of the facility.

(j) Any changes in the personnel listed in this application will be intimated forthwith the licensing authority and the competent authority.

(k) The rules regarding decommissioning, disposal of decayed sources and reuse of the site of the decommissioned facility will be strictly complied with.

(l) A licence shall be valid for a period of three years from the date of issue of the licence.

FORM V

[See Rule 11]

RECORD OF FOOD IRRADIATION

1. Identification number of the irradiation facility
2. Name and address of the Operator and Quality Control Officer
3. Serial number of the batch
4. Date of irradiation

5. Type of sources or election machine
6. Irradiation Dose
7. Type of Dosimeters used and their calibration
8. Minimum and maximum limits of radiation dose
9. Nature, quality and quantity of food to be irradiated
10. Purpose of irradiation
11. Type of packaging used during radiation treatment, if any
12. Specific irradiation conditions used
13. Any other incidents and anomalies observed during irradiation treatment.

(The Gazette of India Part II-Section 3-Sub-section(i) No.9, 1991)

243 Prevention of Food Adulteration (First Amendment) Rules, 1991

G.S.R. 10(E) - Whereas a draft of certain rules further to amend the Prevention of Food Adulteration Rules, 1955, were published as required by sub-section (1) of section 23 of the Prevention of Food Adulteration Act, 1954 (37 of 1954) with the notification of the Government of India, in the Ministry of Health and Family Welfare (Department of Health) No. G.S.R. 4(E), dated the 2nd January, 1990 in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i), dated the 2nd January, 1990 inviting objections and suggestions from the persons likely to be affected thereby before the expiry of a period of sixty days from the date on which copies of the Gazette in which the said notification was published, were made available to the public;

And whereas, the copies of the said Gazette were made available to the public on the 8th march, 1990.

And, whereas, the objections and suggestions received from the public on the said draft rules have been considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) of section 23 of the said Act, the Central Government, after consultation with the Central Committee for Food Standards, hereby makes the following rules, further to amend the Prevention of Food Adulteration Rules, 1955, namely

RULES

1. (1) These rules may be called the Prevention of Food Adulteration (First Amendment) Rules, 1991.

(2) They shall come into force on the date of their publication in the Official Gazette except rules (2) and (4) which shall come into force after a period of six months from the date of publication on these rules in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955 (hereinafter referred to as the said rules),

(1) in clause (c) of rule 29, for the words "papad, sago or plain Dal Biji", the words and brackets "papad (sago or plain), dal biji" shall be substituted.

(2) in sub-rule (B) of rule 42 of the said rules,

(a) in clause (i), in sub-clauses (a), (b) and (c) of clause (i) for the words "litres of milk", wherever they occur, the words "litres of toned milk" shall be substituted.

(b) in clause (ii), for the portion beginning with the words "For the purpose of deciding" and ending with the words "Milk solids other than milk fat", shall be omitted.

(c) in clause (iii), for the words "fresh milk", the words "toned milk" shall be substituted.

(3) in rule 55 of the said rules, after item 35 and the entries relating thereto, the following item and entries shall be added namely:-

1	2	3
*36 Paneer or Chhana	Sorbic acid and its sodium potassium or calcium salts (calculated as sorbic acid)	2000
	or	
	propionic acid and its sodium or potassium salts (calculated as Propionic acid).	2000*

(4) In Appendix 'B' to the said rules -

(a) for item A.11.01.03, the following item shall be substituted, namely :-

"A 11.01.03 - STERILISATION : The term "sterilisation when used in association with milk, means heating milk in sealed container continuously to a temperature of either 115° C for 15 minutes or at least 130° C for a period of one second or more in a continuous flow and then packed under aseptic condition in hermetically sealed containers to ensure preservation at room temperature for a period not less than 15 days from the date of manufacture".

(b) item A-11.02.06 shall be omitted;

(c) after item A.11.02.07.01, the following item shall be inserted, namely -

"A.11.02.07.02 - PROCESSED CHEESE SPREAD means a product obtained by comminuting and mixing one or more types of hard cheeses into a homogenous plastic mass with the aid of heat. It may or may not contain butter, cream, butter oil, milk, skimmed milk, milk powder, cheese whey, sweet butter milk or one or more of these or any of these from which part of water has been removed. It may also contain permitted emulsifying and stabilising agents. It may also contain one or more of the sodium potassium salts of citric acid, phosphoric acid, tartaric acid, lactic acid in such quantities that mass of the solids of such emulsifying agents is not more than 4 per cent of mass of the processed cheese spread. It may contain sequestering and buffering agents, namely, lactic acid, acetic acid, citric acid and phosphoric acid.

It may contain vegetable colouring matter such as annatto, carotene, permitted flavouring agents and milk coagulating enzymes with or without purified calcium chloride (anhydrous salt) and sodium citrate not exceeding 0.02 per cent may be added. It may contain natural sweetening agents, namely, sugar dextrose cane sugar, corn syrup, honey, corn syrup solids, maltose, malt syrup and hydrolysed lactose in a quantity necessary for seasoning and spices and condiments. It may contain sodium chloride not exceeding 3 per cent by weight. Processed cheese spread may contain sorbic acid or nisin or both to the maximum extent of 0.1 per cent by weight. It shall not contain more than 60 per cent moisture and milk fat content (on dry basis) shall not be less than 40 per cent by weight";

(d) in items A.11.02.14 and A.11.02.16, for the words "packed in hermetically sealed containers" wherever they occur, the words "packed in nitrogen or mixture of nitrogen and carbon dioxide in hermetically sealed containers" shall respectively be substituted;

(e) after item A.11.02.21, the following items shall be inserted, namely:-

"A.11.02.21.01 - BUTTER OIL OR BUTTER FAT - are products exclusively obtained from butter or cream and resulting from the removal of practically the entire water and solids-not-fat contents.

It may contain permitted anti-oxidants not exceeding 0.02 per cent by weight except gallate which shall not exceed 0.01 per cent by weight. It shall conform to standards of quality of ghee laid down in item A.11.02.21 except Butyro refracto meter reading which shall be 40.0-44.0 at 40°C. In case of imported butter oil, Reichert value shall not be less than 24.

A.11.02.22 - CHAKKA - means a white to pale yellow semi-solid product of good texture and uniform consistency obtained by draining off the whey from the Yoghurt obtained by the lactic fermentation of cow's milk, buffalo's milk, skimmed milk and recombined or

standardised milk which has been subjected to minimum heat treatment equivalent to that of pasteurisation. It shall have pleasant Yoghurt/Dahi like flavour. It shall not contain any ingredient foreign to milk. It shall be free from mouldness and free from signs of fat or water seepage or both. It shall be smooth and it shall not appear dry. It shall not contain extraneous colour and flavours. It shall conform to the following requirements namely.

	Chakka	Skimmed milk Chakka
i) Total solids, per cent by weight	Min 30	Min. 20
ii) Milk fat (on dry basis) per cent by weight	Min. 33	Max. 5
iii) Milk protein (on dry basis) per cent by weight	Min. 37	Min. 60
iv) Titrable acidity (as lactic acid) per cent by weight	Max. 2.5	Max. 2.5
v) Total ash (on dry basis) per cent by weight	Max. 3.5	Max. 5.0

Chakka when sold without any indication shall conform to the standards of Chakka.

A.11.02 22.01 - SHRIKHAND - means the product obtained from Chakka or Skimmed Milk Chakka to which milk fat is added. It may contain fruits, nuts, sugar, cardamom, saffron and other spices. It shall not contain any added colouring and artificial flavouring substances. It shall conform to the following specifications, namely :-

i) Total solids, per cent by weight	Not less than 58
ii) Milk fat (on dry basis) per cent by weight	Not less than 8.5
iii) Milk protein (on dry basis) per cent by weight	Not less than 10.5
iv) Titrable acidity (as lactic acid) per cent by weight	Not more than 1.4
v) Sugar (Sucrose) (on dry basis) per cent by weight	Not more than 72.5
vi) Total ash (on dry basis) per cent by weight	Not more than 0.9

In case of Fruits Shrikhand it shall contain Milk fat (on dry basis) per cent by weight . Not less than 7.0 and Milk Protein (on dry basis) per cent by weight.. Not less than 9.0".

[No. P. 15014/2/89 PH(F&N)]
BALBIR SING, Jt. Secy

(The Gazette of India Part II-Section 3-Sub-section (1)
No. 9, 1991, 5-6)

44 Prevention of Food Adulteration (Second Amendment) Rules, 1991

G.S.R. 24(E):- Whereas certain draft rules further to amend the Prevention of Food Adulteration Rules, 1955 were published as required by sub-section (1) of section 23 of Prevention of Food Adulteration Act, 1954 (37 of 1954) in the notification of Government of India in the Ministry of Health and Family Welfare (Department of Health) No.G.S.R. 92(E) dated 22nd February, 1990, in the Gazette of India, Extraordinary Part II, Section 3, Sub-section (i) dated the 22nd February, 1990, in page 1-4 inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of sixty days from the date on which copies of the Gazette of India in which the said notification was published were made available to the public;

And whereas the copies of the said Gazette were made available to the public on 24th April, 1990.

And whereas the objections and suggestions received from the public on the draft rules have been considered by the Central Government.

Now, therefore, in exercise of the powers conferred by sub-section (1) of section 23 of the said Act, the Central Government, after consultation with the Central Committee for Food Standards, hereby makes the following rules further to amend the Prevention of Food Adulteration Rules, 1955, namely :-

RULES

1. (1) These rules may be called the Prevention of Food Adulteration (Second Amendment) Rules, 1991.

2. They shall come into force after the expiration of a period of three months from the date of their publication in the Official Gazette.

3. In the Prevention of Food Adulteration Rules, 1955, in Appendix B, -

(a) in item A.17.01 after clause (e), the following clause shall be added, namely -

"(f) Unsaponifiable matter .. Not more than 1.0 per cent".

(b) in item A.17.02, -

(i) for the words "COTTON SEED OIL" Binola Ka Tel) means the oil expressed from clean, sound and decorticated cotton seed (gossypium), refined and dehydrated", the words "COTTON SEED OIL" (Binola Ka Tel) means the oil extracted from clean, sound delinted and decorticated cotton seeds (genus Gossypium). It shall be refined", shall be substituted;

(ii) after clause (f), the following clause shall be inserted, namely:-

"(g) Bellier Test (Turbidity .. 19.0°C to 21.0°C temperature - Acetic acid method).

(c) in item A.17.06 for clause (f), the following clause shall be substituted, namely:-

"(f) Bellier Test (Turbidity ... 23.0°C to 27.5°C temperature - Acetic acid method)

(d) after item A.17.15, the following item shall be inserted, namely:-

"A.17.15.01 - Interesterified vegetable fat means an edible fatty material that has been so treated as to bring about a re-arrangement of fatty acid positions within the glyceride entities and hence a change in the physical properties like melting point, viscosity, specific gravity and the like with very little change in the constitution of the fatty acids themselves by a process of interesterification of the essentially neutral edible oil or fat, singly or in mixtures generally through the use of alkaline catalysts exemplified by sodium or potassium metals, or their ethoxides or hydroxides in the form either of anhydrous powders or in anhydrous glycerol medium followed by such post-process steps as washing, bleaching and deodourisation, the last of which can be omitted if the interesterified fat is to be incorporated as part of the raw material for further processing in edible fat products.

The intereſterified fat shall be clear, free from soap, flavouring substances, rancidity, suspended or other foreign matters, separated water and mineral oil. It shall conform to the following standards, namely -

(i) It shall not contain any harmful colouring, flavouring or any other matter deleterious to health;

(ii) No colour shall be added to interesterified fat unless so authorised by Government, but in no event any colour resembling the colour of ghee shall be added;

(iii) If any flavour is used, it shall be distinct from that of ghee in accordance with a list of permissible flavours and in such quantities as may be prescribed by Government;

Provided that diacetyl to the extent of not more than 4.0 ppm may be added to interesterified fat exclusively meant for consumption by the Armed Forces;

(iv) It shall not have moisture exceeding 0.25 per cent;

(v) The melting point as determined by capillary slip method shall be from 31°C to 41°C both inclusive;

(vi) The Butyro-refractometer reading at 40° C, shall not be less than 48;

(vii) It shall not have unsaponifiable matter exceeding 2.0 per cent;

(viii) It shall not have free fatty acids (calculated as Oleic acid) exceeding 0.25 per cent;

(ix) The product on melting shall be clear in appearance and shall be free from staleness or rancidity, and pleasant to test and smell;

(x) It shall contain raw or refined sesame (til) oil not less than 5 per cent by weight, but sufficient so that when it is mixed with refined groundnut oil in the proportion of 20:80, the colour produced by the Baudouin Test shall not be lighter than 2.0 red units in a 1 cm. cell on a Lavibond scale;

(xi) It shall contain not less than 25 I.U. of synthetic Vitamin 'A' per gram at the time of packing and shall show a positive test for Vitamin 'A' when tested by Antimony Trichloride (Carr-Price) reagent (as per IS: 5886-1970);

(xii) No anti-oxidant, synergist, emulsifier or any other such substance shall be added to it except with the prior sanction of the Government".

(c) in item A.17.18, after clause (g), the following clause shall be inserted, namely -

"(h) Bellier test : not more than 19.0° C (Turbidity temperature - Acetic acid method).

(The Gazette of India Part II - Section-3-Sub-section (i), No.23 1991, 4-5)

245 Prevention of Food Adulteration (Third Amendment) Rules, 1991

G.S.R. 124(E) - Whereas a draft of certain rules further to amend the Prevention of Food Adulteration Rules, 1955, were published as required by sub-section (1) of Section 23 of the Prevention of Food Adulteration Act, 1954 (37 of 1954) with the notification of Government of India, in the Ministry of Health and Family Welfare (Department of Health) G.S.R. No. 657 (E) dated 24th July, 1990, in the Gazette of India, Extraordinary, Part II, Section 3, sub-section (i), dated the 24th July, 1990 at pages 1 to 5, inviting objections and suggestions from all persons likely to be affected thereby before the expiry of a period of sixty days from the date on which copies of the Gazette in which the said notification was published, were made available to the public.

And, whereas the said Gazette was made available to the public on the 7th September 1990;

And, whereas, the objections and suggestions received from the public on the said draft rules have been considered by the Central Government.

Now, therefore, in exercise of the powers conferred by Sub-section (1) of Section 23 of the said Act, the Central Government, after consultation with the Central Committee for Food Standards, hereby makes the following rules further to amend the Prevention of Food Adulteration Rules, 1955, namely:

RULES

1. (1) These rules may be called the Prevention of Food Adulteration (Third Amendment) Rules, 1991.

(2) They shall come into force from the date of their publication in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955, in Appendix 'B', item A.01.01 -

(1) in the second paragraph for the words, "Caffeine not exceeding 200 parts per million, and" the following words shall be substituted, namely -

"Caffeine not exceeding 200 parts per million, Estergum (Glycerol ester of wood rosin) not exceeding 100 parts per million, and".

(2) after the proviso to the second paragraph, the following paragraph shall be added, namely:-

"It shall conform to the following requirements, namely:-

(1) Total plate count per ml not more than ... 50

(2) Coliform count in 100 ml .. 0

(3) Yeast and mould count per ml not more .. 2"
than

Provided further estergum used in carbonated water shall have the following standards, namely:-

"Glycerol esters of wood rosins commonly as Estergum is hard yellow to a pale amber coloured solid. It is a complex mixture of tri and diglycerol esters of rosin acids from wood rosin. It is produced by the esterification of pale wood rosin with food grade glycerol. It is composed of approximately 90 per cent resin acids and 10 per cent neutrals (non-acidic compounds). The resin acid fraction is a complex mixture of isomeric diterpenoid monocarboxylic acids having the typical molecular formula of $C_{20}H_{30}O_2$ chiefly abietic acid. The substance is purified by steam stripping or by counter-current steam distillation.

Identification

Solubility - Insoluble in water, soluble in acetone and in Benzene

Infra Red Spectrum - Obtain the infrared spectrum of a thin film of the sample deposited on a potassium bromide plate - Scan between 600 and 4000 wave numbers. Compare with typical spectrum obtained from pure Estergum.

Test for absence of Tall oil Rosin) (Sulfur test)

- Pass the test as given below:

When sulfur-containing organic compounds are heated in the presence of sodium formate, the sulfur is converted to hydrogen sulfide which can readily be detected by the use of lead acetate paper. A positive test indicates the use of all oil rosin instead of wood rosin.

Apparatus - Test Tube: Use a standard, 10 x 75 mm, heat-resistant, glass test tube - Burner, Bunsen: A small size burner of the microflame type is preferred.

Reagents - Sodium Formate Solution : Dissolve 20 g of reagent grade sodium formate, NaOOCCH_3 , in 100 ml of distilled water.

- Lead Acetate Test Paper : Commercially available from most chemical supply houses.

Procedure - Weigh 40-50 mg of sample into a test tube and 1-2 drops of sodium formate solution. Place a strip of lead acetate test paper over the mouth of the test tube. Heat the tube in the burner flame until fumes are formed that contact the test paper. Continue heating for 2-5 minutes. There must be no formation of a black spot of lead sulfide indicating the presence of sulfur containing compounds. Detection Limit : 50 mg/kg sulfur).

Drop softening point - Between 88° and 96° C.

Arsenic - Not more than 3 ppm.

Lead - Not more than 10 ppm

Heavy metals (as lead) - Not more than 40 ppm

Acid value - Between 3 and 9

Hydroxyl number - Between 15 and 45

[No.P-15014/3/90-PH CF&N]

BALBIR SINGH, Jt. Secy.

DMS & PFA

(The Gazette of India Part II - Section 3-Sub-section(i), No.90, 1991)

246 Improved rapeseed edible oil (Canola oil)

SVO Enterprise (USA) announced last November a patent application by its parent, Agrigenetics Co. and the Idaho Research Foundation for improved rapeseed varieties, developed through conventional breeding and mutagenesis yielding canola oil with oleic acid level up to 94%, saturated fat content as low as 3% and no erucic acid.

Current canola oils, lowest in saturated fat of all vegetable oils, typically contain 60% monounsaturated oleic acid and 6% saturated fat.

(Chemical Weekly 36(34), 1991, 94)

247 FDA in USA approves a new microbial origin gellan gum

Pharmaceutical and food scientists will enjoy greater flexibility in developing gelled foods with the use of gellan gum, a new hydrocolloid introduced under the trade name KelcoGel by Kelco, a division of Merck and Co. Inc (USA). The gum received approval from the US Food and Drug Administration last September, for use as a stabiliser and thickener in frostings, icings, glazes and non-standardised jams and jellies.

A white to tan, free-flowing powder the gum is a high molecular weight extra-cellular polysaccharide elaborated by Pseudomonas elodea during metabolism of a carbohydrate. Structurally, it contains the following repeating units.

- a. 1,3-B-D glucose
- b. 1,4-B-D gluconic acid
- c. 1,4-B-D glucose and
- d. 1,4-B-L rhamnose unit.

Gellan gum is the first microbial origin gum to be granted FDA approval for food use since xanthan gum and dextran as the third approved polysaccharide by microbial biosynthesis. More than 12 years have gone into the development of gellan gum.

Gellan gum is distinguished to its gel forming properties, versatility and compatibility with other food ingredients. Other noteworthy properties of gellan gum are its clean release of flavours, particularly delicate fruit flavours, clarity in gels, stability in the pH range of 3.5 to 8, which typifies most food systems and thermal stability. The strain of P. elodea employed in production of gellan gum is non-pathogenic and non-toxic to man and animals. Further, the gum is produced by a process that renders it free of viable cells of P. elodia. These factors were crucial in the final approval of the gellan gum by FDA.

(Food Technology November 1990, 16)

248 Borax banned in Indonesia

The Health Ministry of Indonesia recently banned the use of borax in food. Several food products containing borax were either withdrawn or eradicated.

Ostensibly, borax could cause fever, aneurism, coma, depression, kidney disorder or even death, if used in large quantity.

The regional health offices and the drugs and food research centres were instructed to take security measures against the use of borax in food as well as observe salt water containing borax. (Asia Pacific Food Industry March 1991, 33)

Hygiene

249 Fat finds its own level in the daily diet

The amount of fat we eat is the most important factor controlling hunger and appetite. This finding is linked to the observation that as countries grow richer, the national consumption of fat eventually levels out at around 40 per cent of the nation's total energy intake.

"There seems to be an inherent tendency for free-choice diets to stabilise at around 40 per cent energy from fat, so long as economic development allows," says Martin Wiseman, head of the Nutrition Unit in Britain's Department of Health. Speaking at a conference in Reading, Berkshire, on fat and the diet, Wiseman presented data from seven countries that supported the view that as nations become richer, fat consumption edges up towards the 40 per cent mark.

Japan, for example, where fat intake has traditionally been very low, is now speeding towards the plateau. A survey of 20,000 Japanese published this month by the country's Health and Welfare Ministry, showed that fat forms 25.7 per cent of the diet. In 1955 this figure was only 8.7 per cent.

Wiseman speculates that the so-called "fat factor" governing appetite may have given humans some kind of evolutionary advantage in the past. People with the most stored fat would be more likely to survive food shortages than their leaner cousins. But, says Wiseman, such an adaptation may be less healthy in today's times of abundant food.

The new evidence supporting the "fat factor" theory comes from John Blundell, a reader in biological psychology at the University of Leeds. He carried out a study in which he monitored the diet of two

dozen active young men. As part of their diet, the men ate special breakfasts which included scones that were high, medium or low in fat.

Blundell concealed the amounts of fat in the three kinds of breakfast by substituting to differing degrees real fat with Olestra, a sucrose polyester that mimics fat but is not digested and contains no calories.

He found that subjects on the low-fat diets developed hunger pangs sooner than those eating fat-rich diets, and they eventually began to make up their calories by eating more carbohydrate, particularly in their evening meals.

He concludes that the calories in fat do help to satiate and suppress appetite, but that the effect is not immediate, "suggesting a post-absorptive action". In other words, eating fat does not immediately satisfy hunger, but it will restrain your calorie intake in later meals.

Wiseman said that whether the fat factor theory proves correct or not, Britons still eat far too much fat. Only one-third of Britons have been able to limit their energy intake from fat to 35 per cent, as recommended by the Department of Health's Committee on Medical Aspects of Food Policy.

(New Scientist No.1769, 18 May 1991, 16)

250 Low down on fat

A low-fat diet may protect against colon cancer, but it has to be very low-fat to do the trick, according to separate studies presented at a major biology meeting this week. Researchers from the Harvard School of Public Health found that men with the lowest fat intake - an average of 24% of calories from fat - had only half the rate of adenoma colon polyps, a common precursor of colon cancer, as men with the highest fat intake, averaging 41%.

(Deccan Herald 25 April 1991, 10)

251 Clues to how garlic suppresses cholesterol levels

Scientists studying suppression of atherosclerosis by garlic in experimental rabbits are gaining clues to how exactly the white bulb prevents or retards atherosclerosis.

A cholesterol-rich diet invariably increases the level of cholesterol in plasma, aorta and liver, and total lipids, phospholipids and free fatty acids in the liver and aorta.

Studies conducted by scientists at the Punjab Agricultural University, Ludhiana, indicate that when garlic is included in a cholesterol-rich diet, it reduces the uptake of cholesterol by the aorta, and increases the mobilisation of cholesterol and other lipids, leading to their decreased biosynthesis in the aorta.

Garlic also increases the excretion of bile acids through the faeces and the fibrinolytic activity.

The scientists reported their findings after detailed histochemical and histopathological studies on male rabbits.

The tests showed that addition of garlic to a cholesterol-rich diet reduced the extent and severity of atherosclerosis which is the inevitable result of excess cholesterol.

While 90 per cent of the animals fed with only cholesterol-rich diet had atherosclerosis, only 50 per cent of those animals fed with cholesterol plus garlic the report said.
(P.T.I. Science Service 10(8), 1991, 5)

252 Scentless garlic on the way

Along comes a "new" garlic whose creator promises it will leave your breath and body free of garlic odour.

Taeko Bybee says the new garlic "does whatever ordinary garlics do, except repel neighbours. They will not detect that you have eaten it".

The garlic consists of a special solution containing, according to the package, "natural silica and organic plant sources" that neutralize the substance in garlic that reacts with body chemicals to produce the odour on the breath. It's FDA-approved.
(Food Business 29 January 1990, 48)

253 Cheese eaters get good dental news

They're not sure why it happens, but dental researchers have found that eating certain kinds of cheese may help prevent cavities. Aged Cheddar, Edam, Gouda, Monterey Jack, mozzarella, Muenster, Port du Salut, Roquefort, Romano, Stilton, Swiss and Tilsit all are on the list of potential cavity preventers.

The tooth decay process starts when bacteria on teeth called plaque break down dietary sugars, causing acid to accumulate on the teeth. The acid attacks the tooth enamel, and after the enamel breaks down, a cavity is formed.

Researchers have not identified the mechanism by which certain cheeses help prevent cavities, but they believe the calcium and phosphate in cheese may help buffer the acid that is produced by oral bacteria, and that they may promote remineralization.
(Food Business 12 March 1990, 55)

254 Chocolate checks the chill

It looks like an ordinary chocolate bar, tastes like an ordinary chocolate bar, but the Canadian Cold Buster is far from an ordinary between-meals snack. Lawrence Wang of the University of Alberta believes his new bar could save lives.

The Canadian Cold Buster is designed to combat hypothermia, the sometimes fatal depression of body temperature caused by prolonged exposure to cold. To test the chocolate, researchers monitored the deep body temperatures of student volunteers who spent three to six hours in a room at a temperature of between -8 and -10°C , dressed only in shorts and T-shirts.

"The results were consistent and quite phenomenal", Wang reported. "After one bar the subjects typically increased their cold tolerance by 50 per cent". Students who did not eat Cold Busters cooled quickly. Within three hours their core body temperature dropped by 1°C . "If your core temperature drops by 2°C you are considered clinically hypothermic and you must be taken to hospital," says Wang.

With the bar, body temperature dropped by less than 0.5°C in the three-hour test. This means that someone who ate a Canadian Cold Buster after becoming lost or stranded in cold weather would have "at least twice as much time to seek help or shelter before they reach the critical body temperature at which they become incapacitated", claims Wang.

Wang's bar is made of natural food ingredients, including those found in many other chocolate bars: milk protein, honey, cocoa powder, spices, carbohydrates and vegetable oils. But, according to Wang, the chocolate is formulated so that it helps the body to use fat more efficiently in the cold. In freezing weather, it takes a lot of energy to maintain a normal body temperature of 37°C . To keep warm, we shiver, using energy from stored fat. But, says Wang, the body has a physiological bottleneck: "When we're in the cold we generate a product called adenosine. Adenosine blocks our ability to convert the body's fat into a usable form of energy. The Canadian Cold Buster bar contains natural substances that neutralise the effect of adenosine and so increases our ability to convert fat into a form that muscle can use to generate heat".

The bar also provides a quick surge of energy. Unlike most chocolates, which provide energy in the form of fat, much of the Cold Buster's energy comes from carbohydrates.
(New Scientist 20 April 1991, 17)

255 New milk has no cholesterol

A cholesterol-free milk product ?

It sounds unlikely because all animal-derived products contain cholesterol, but a Georgia dairy is experimenting with a product made

by extracting the animal fat from milk and replacing it with vegetable oil. Sun-up, marketed by Mathis Dairy, Decatur, Ga., sells for about 30 cents more per half gallon than regular milk.

"We're excited about what this could mean to the dairy industry as a whole," said Jack Mathis, vice president. "I can see where we could have a complete line of dairy products that would be cholesterol free".

Sun-up came to market as a joint venture between Mathis and Sun Up Farms, a small Atlanta dairy that formulated the drink.

Although Mathis believes Sun-up is the first cholesterol-free milk product to hit the market, he expects other companies to develop similar products.

(Food Business 10 September 1990, 36)

256 Friendly coffee

Coffee addicts will soon be able to drink their drug all day without the discomfort of heartburn. Coffee stimulates the stomach to produce excess acid, but no-one knows why. Removing the caffeine did not help and adding alkaline agents spoiled the taste.

Kraft claims to have cleared up the mystery in its European patent application (397344) and is now promising "stomach-friendly coffee".

The company found that malic acid in the coffee stimulates the stomach acids that produce heartburn. They propose using bacterial cultures or ion exchange resins to remove the malic acid from freeze-dried raw coffee. The caffeine can either be left in or removed from the coffee by a separate process.

Kraft has been testing this new coffee on cats because their stomachs produce gastric juices much like humans. Cats drinking malic-free coffee had less acid in their stomach than cats given conventional coffee.

(New Scientist 30 March 1991, 20)

257 Decaf called possible villain

People who switch to decaffeinated coffee to avoid the jitters may be unknowingly raising their cholesterol levels and even heightening their risk of heart disease, a study suggests.

Researchers have long suspected but never proven that caffeine, the chemical that gives coffee its jolt, was somehow involved in heart trouble.

The study raises the possibility that coffee without caffeine could be the real villain.

The research, conducted at Stanford University, found that people who went from regular coffee to decaf increased their levels of low-density lipoprotein - the so-called bad cholesterol - an average of 7 per cent.

He says he doubts that the process of removing caffeine changes the coffee so that it raises cholesterol. Instead, he says, the difference may result from the kinds of beans that go into various types of coffee.

In general, he says, mild arabica beans are used to make regular coffee, while most decaffeinated brands use more strongly flavoured robusta beans.

Superko calculates that the average 7 per cent annual increase in bad cholesterol in his subjects could translate into about a 12 per cent jump in the risk of heart disease.

No single study can prove that something is harmful, and the Stanford findings will have to be duplicated by other researchers before doctors are certain they are true.

George Boecklin, president of the New York-based association, says: "Coffee and cholesterol have been investigated in many studies with conflicting results. We agree with researchers that it is too soon to make any definite choices".

One of those who questions the latest findings is Dr. Charles Hennekens, head of a Harvard study of aspirin's role in preventing heart attacks.

He speculates that some other habit of decaf drinkers, rather than their morning brew, may be responsible for the higher cholesterol.

"One has to question whether it's something else that coffee is a marker for, rather than coffee itself", he says.
(Food Business 18 December 1989, 26)

258 Seafood - good news

Marine delicacies like shrimps, lobsters, crabs and oysters can now be eaten without worrying about cholesterol levels rising, according to a US-based study, released recently. Sources quoting the results of the study conducted by the medical research team in the University of Washington, said contrary to popular belief, eating shell fish does not increase cholesterol levels. The finding is good news for those who had restricted their intake of seafood due to a heart condition or a family history of heart disease. The study, conducted on 18 men with normal cholesterol levels, found that when animal fats were substituted with seafood, cholesterol levels actually came down. The research proved that in combination with a low-fat diet shell fish would not cause an increase in cholesterol.
(Deccan Herald 18 April 1991, 10)

259 Low cholesterol foods

Low cholesterol eggs, dairy products and fast foods may soon be available to health-conscious consumers. Australian researchers are putting the finishing touches to two technologies which, they say, remove up to 90 per cent of the cholesterol from certain foods without altering their taste, nutritional value or texture.

High levels of cholesterol in the blood have been firmly linked with heart disease, so low-cholesterol foods could improve the health of people at risk of heart ailments. Charn Sidhu, a biochemist working at CSIRO, Australia's government research organisation says the new technology could help people keep their intake of cholesterol below the 300 milligrams per day recommended by the US Heart Foundation.

Sidhu and his colleague David Oakenfull have developed a polymer based on betacyclodextrin (BCD) - a nontoxic agent derived from starch which binds with the cholesterol in cracked eggs and milk. The binding occurs because of the doughnut-like structure of the BCD molecule. The cholesterol is attracted into the centre of the molecule where it fits snugly into the doughnut's hole.

The food is then spun in a centrifuge to separate out the cholesterol-packed BCD. In commercial applications, says Sidhu, 80 to 90 per cent of the cholesterol could be removed.

According to Sidhu, a real advantage to the BCD technique is that it works at temperatures as low as 5°C. This means that food is not spoiled by heating and it can be refrigerated during processing to prevent the growth of microorganisms. He says that many food processing companies already have the necessary equipment, and that BCD can be made cheaply.

Neil Foster, a chemical engineer at the University of New South Wales, is using a technique known as supercritical fluid technology (SFT) to extract cholesterol from fats and oils. Supercritical fluids are created when gases are compressed beyond the critical point at which they would normally become liquids. In their supercritical fluid state the gases exhibit properties of both gases and liquids.

Carbon dioxide, for instance, becomes supercritical at 30°C and roughly 73 atmospheres. The trick to SFT, says Foster, is finding the right balance between pressure and temperature for specific applications.

To remove cholesterol, Foster bubbles supercritical carbon dioxide through a vessel similar to a home pressure cooker which contains the fats or oils. The liquid properties of the carbon dioxide dissolve the cholesterol. Next, the supercritical fluid is returned to its gaseous state by lowering the temperature and pressure in the vessel. The gas diffuses from the oil taking the dissolved cholesterol with it. The cholesterol is then deposited on an absorbent bed, and the carbon dioxide is recycled.

Foster claims the procedure removes all the cholesterol that is not attached to lipids - roughly 90 per cent of the total. And because carbon dioxide becomes a supercritical fluid at close to room temperature, heat-sensitive foods are not damaged during processing. At present, Foster is scaling up his design and looking for commercial partners.

(New Scientist No. 1769, 18 May 1991, 128)

260 Seeds help decontaminate water

Seeds that resemble chickpea could provide a new and cheap way to protect people from serious waterborne diseases ranging from typhoid, dysentery and cholera to river blindness.

The seeds from the horse-radish tree Moringa oleifera, widespread in Africa, India and Indonesia contain proteins that make the particles in cloudy and contaminated water coagulate.

The coagulated particles settle to the bottom taking with them many of the bacteria and viruses that cause waterborne disease, and leaving the rest of the water clear and safe to drink. The only other way to achieve this is to add aluminium sulphate. But this is an expensive chemical.

Now engineers at the University of Leicester are testing out a prototype decontamination system that works on a larger scale; operators can control the process and monitor the quality of water they provide, guaranteeing that whole communities receive clean drinking water.

Researchers hope to evaluate the quality of water treated with the plant, which can provide drinking water for 2500 people.

The team will also compare means of disposing the contaminated sediments. The options are burning and burying. But Grant, says the best solution would be to bake the sediment in the sun. The sunlight can decompose organic contaminants and kill pathogens in the sediments.

The researcher hopes to discover more about the biological activity of the protein coagulant, which accounts for around 30 to 40 per cent of the weight of each seed. He suspects that it acts as a polyelectrolyte, crosslinking charge particles.

(Deccan Herald 30 May 1991, 1)

Transfer of Technology & New Industries

261 J.K. Industries dairy venture

J.K. Industries Ltd of the J.K. Singhanian group of companies has received government clearance for a Rs. 30-crore project; its first foray into dairy products. The plant, to be set up in Uttar Pradesh, will manufacture 10,000 tonnes per annum (tpa) of yoghurt, 18,000 tpa of flavoured milk, 1,800 tpa of malted and infant milk and 300 tpa of low-fat cheese.

(Business India 27 May - 9 June 1991, 21)

262 Britannia sells soya unit to SM Dyechem

Britannia Industries Ltd., has sold its soya unit at Vidisha, Madhya Pradesh to SM Dyechem Ltd., (SMD). An agreement to this effect was signed between the two companies on April 17, 1991.

Britannia has sold the soya division because it, feels that the soya business will not be in synergy with the company's future. Britannia's tie-up with BSN Groupe of France has meant that the company will now try to strengthen its current stronghold in the bakery segment and also establish itself as the country's premier food company through diversification in the processed foods market.

(The Economic Times 20 April 1991, 1)

263 Enkay's new venture

Enkay Texofood Industries Ltd is launching a 100 per cent export-oriented unit (EQU) at a cost of Rs. 20.20 crore at Bhilad near Valsad in Gujarat for the manufacture of 17,875 tonnes per annum of fruit concentrate pulp and aroma. The unit will have a technical collaboration with Henschel Exports GmbH of Germany, a wholly-owned subsidiary of Thyssen, one of the largest European enterprises. Enkay has also entered into buy-back agreements for five years with established buyers of repute to export its entire production at internationally prevailing market rates. The plant, which will employ the latest technology of aseptic packaging, will be processing banana, mango and papaya.

(Chemical Products Finder 9(10), 1991, 127)

264 All seasons food's new project

All Seasons Foods Ltd is setting up a plant for the manufacture and export of meat, sea food and poultry products to the US and European countries. The plant is expected to generate sales of over Rs. 300 crore annually for the company within two years' time. The company's plant will also be in a position to manufacture all kinds of baby foods, vegetable pulps and purees, thus generating an additional revenue of Rs. 20 crore. Besides, the plant will be capable of manufacturing all kinds of soups, milk drink and mango and orange drinks. These instant drinks will be sold through the company's vending machines. The company, meanwhile, has achieved a higher turnover of Rs. 32.86 crore as against Rs. 24.75 crore - a rise of 33 per cent.

(Chemical Products Finder 9(11), 1991, 139)

Special Article -

HEALTH FOODS

S. V. Padgaonkar

Food and medicine form a potential combination to fight diseases. Food can also be "thy friend and enemy"—advised Hippocrates, which is followed assiduously by all civilizations. Galen—the father of observational medicine—also believed that fundamentals of good medicine lay in the diet. Virtually all systems of traditional medicine in China, India and Egypt incorporated food modifications as significant components of treatment. As a corollary to this concept, western food industry was built around the conviction that certain foods or dietary patterns could cure or cause disease. John Harrey, W. K. Kellogi and Charles W. Post founded great American food companies with an assurance of providing good health to consumers using their products.

Since many health disorders are caused or aggravated by poor nutrition, the diagnosis of deficiency states formed an important breakthrough in medical sciences. In the 1950s, attention shifted to the more technologically consistant approach of isolating and synthesizing the drugs and selected nutrients found in natural products, including foods, for combating diseases. In later years nutrients were found to function as substrates, cofactors and allosteric effectors in cellular metabolism. In view of this, diseases such as inborn errors of metabolism, diabetes mellitus, or conditions concerned with fluid and electrolyte balance or acute metabolic derangements (acute renal failures, hepatic failure) have since been ably managed with rather simple and straightforward dietary intake adjustments. Special programs have been developed for renal dialysis patients and in aero space medicine and for total parenteral nutrition regimens.

The whole health food industry, which in Britain alone involves 2000 specialist's shops and a startling annual turnover of £ 120 million, has led to a modification in public health policies.

We are in the middle of the major change in the outlook in Indian medicine with both physicians and consumers viewing diet as a component not only for achieving good health but also for its maintainance and possible improvement. The attention at present has been focussed towards manufacturing food formulations in a variety of forms, to cater to diverse situations

encountered in preventive medicine and also for the treatment of disorders, diseases, traumas, convalescence and ietiogenic maladies.

WHAT ARE HEALTH FOODS ?

Health foods are defined in two ways. These are:

a) Supplements and tonics with important promoting properties and their many different effects, as the dietary supplements, being due to purity and combination of active nutritional ingredients and special manufacturing process and efficacy being demonstrated in scientific experiments.

b) Medical foods constituting a class of substances which are both foods and medicines, used under the supervision of a physician, for the dietary management of a specific disease, disorder or clinical condition.

How do they work ?

Health foods are rich in vital nutrients that can be readily digested and assimilated. Active ingredients present are in a balanced proportion. They serve to strengthen the body and activate all physiological functions

Why do we need them ?

It is well known that our body's defence against infection wears out and the general health is impaired if even a single vital active ingredient (vitamin, mineral, amino acid, etc.) is lacking in our diet. The presence of a deficiency is very difficult to monitor. Health foods, when taken as supplements, are able to compensate for dietary deficiencies.

The decisive advantages of Health-Foods in general

Health foods are effectively used in:

- combating stress and fatigue
 - inspiring mental & physical performance
 - building up resistance to infections and stress
 - promoting vitality
 - for recoupment during convalescence
 - by lactating and nursing mothers
- and are suitable for self-medication and are both safe and effective.*

Nature of Health Foods

A large number of health foods have been developed over the years and the market for these is expanding at a rapid rate not only in the industrially advanced nations but also in the developing world. Special health foods are formulated to meet the needs of the metabolically handicapped—certain states of ill health, many of which are chronic—result in deviations in nutritional requirements from the normal. Special health foods could cater individuals suffering from coronary heart diseases, lactose intolerance, diabetes, obesity, hypercholesterolemia, etc. These foods are distinguished by their special composition and/or by their physical, chemical, biological or other modifications resulting from processing. The nutrients are vitamins & minerals needed in macro or trace quantities, amino acids—mainly the essential ones, essential polyunsaturated fatty acids, and caloric fats and/or carbohydrates. Foods may contain antinutritional principles, which have to be inactivated or eliminated by the processing treatment. Dispensibility, water absorption rate and other textural properties are controlled by the processing methods.

Health Food Scene in India

The health foods available in our country are:

- A) Nutritional health foods, mainly the high-protein foods
 - (i) Water dispersible products based on pure proteins and having 80 to 90% protein content. e.g. Calcium Caseinate (Casilan and Trophamin) and Sodium Caseinate (Sanaetogen), useful in formulating the products at a required level of protein.
 - (ii) Ready-to-eat high protein products in the form of biscuits. e.g. Threptin, Uni-protein and Briskies, (protein level between 18 to 30%)
 - (iii) Products in the form of powder or granules for making beverage in milk or water. These are based on hydrolysed proteins. e.g. Protinex and Protinules.
 - (iv) Products containing intact proteins, in the form of protein rich materials such as whole or skim milk

Health Foods are Classified as:

Nutritive & nourishing foods, Health food supplements, Foods for special dietary requirements, Advanced medical nutrition, Medical foods, Protective foods, Stimulant foods and so on.

powder, protein isolates or concentrates from groundnut or soyabean. e.g. Trophox, Syu, Provitex, Promolan, Procasenol, Provita, Spert, Nurrish (protein level varying from 20 to 50%)

B) Special health foods meant for healthy persons in different age groups or environmental conditions

- (i) Malted milk foods: e.g. Horlicks, Viva, Ero-Protein.
- (ii) Fortified milk foods: e.g. Complan, Protal, Enrich.
- (iii) Malt-Cocoa-Milk foods: e.g. Bournvita, Boost and Maltova.

These products are enjoyed with milk as pleasant tasting beverages, by the young and the old. The claims made for these health products may be more exaggerated. Protein content of these vary between 10 to 30%.

Liquid Protein Supplements

Predigested proteins have been in use in oral nutritional formulations for convalescents and patients with gastrointestinal disturbances. These act as complete nutritional supplements normally fortified with iron, vitamins and L-lysine in a suitable flavoured base. Such preparations should contain 1 calorie per ml. and provide high-nitrogen enabling complete nutritional support for the stressed patients with an increase in resting metabolic expenditure of greater than 30%.

Some liquid products currently marketed are:-

- (1) Proton (Aristo Pharm)
- (2) Polype (Rallis India Ltd.)
- (3) Proferrin (Indoco Remedies Ltd.)
- (4) Pronutrin (CFL Pharm. Pvt. Ltd.)
- (5) Prosan (Sandoz (I) Ltd.)

Production of Protein-rich Supplements

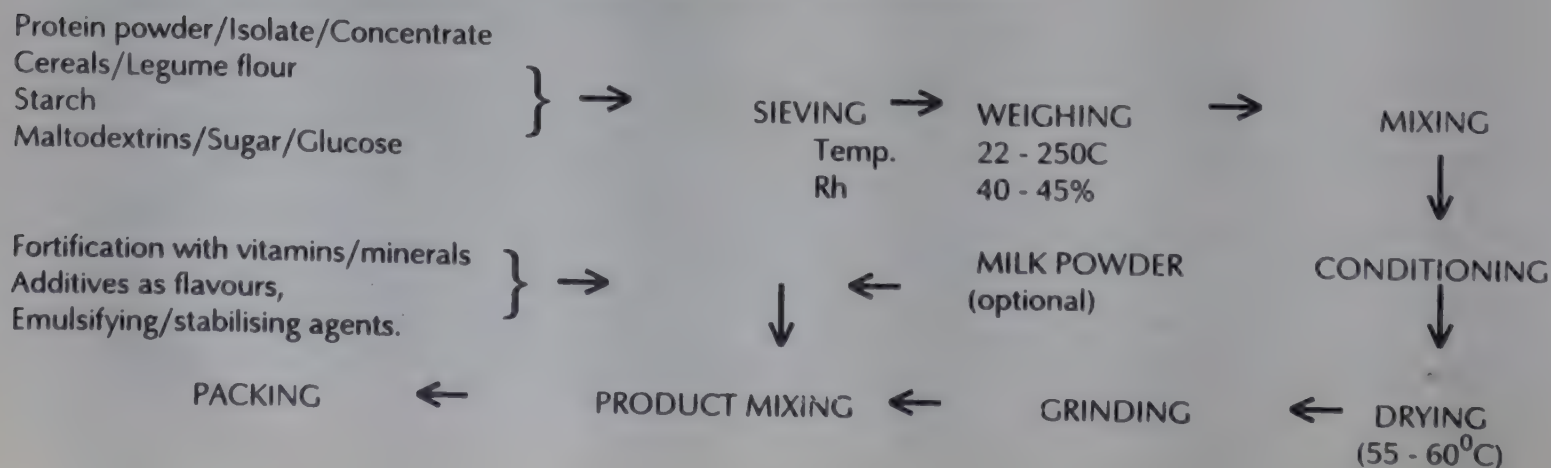


Table 1
Major Protein Supplements in India

<i>Brand</i>	<i>Company</i>	<i>Composition</i>	<i>Positioning</i>
PROTINEX (G)	Pfizer	Groundnut protein hydrolysate, Vitamins, Carbohydrates, Minerals.	Nutritional supplement.
COMPLAN (P)	Glaxo	Milk protein, Vegetable oil, Maltodextrins, Vitamins, Trace mieraals.	Complete planned food, Nutritional supplement
SYU (G)	Anglo French	Vegetable & Milk proteins, Carbohydrates, Vitamins, Minerals.	Food supplement for entire family.
TROPHOX (P)	Raptakos	Soya protein concentrate, Milk proteins, Vegetable fat, B-Vitamins.	Children, lactating mothers, diabetics, cenvalescents.
PROVITEX (P)	Rallis	Milk protein, Malt extract, Vitamins, Minerals.	Nutritional supplement.
PROBOFEX (C)	Wockhardt	Protein hydrolysate, Carbohydrates, Vitamins.	Food supplement.
CAL-750 (P)	Raptakos	Milk protein, Fat, Carbohydrate, Vitamins, Minerals.	Weight control, slimming diet.
THREPTIN (B)	Raptakos	Casein, Bengal gram, Dextrin, Hydr. fat, Malt extract, Vitamins, Minerals.	Meal between meals, hunger appeasing.
SPERT (P)	Wander Ltd.	Caseinate, Predigested cereal extract, Carbohydrates, Vitamins, Minerals.	Canvalescents, nursing & lactating mothers, pre- or post operatively.
PROMOLAN (P)	Sarabhai Chemicals	Proteins, Carbohydrates, Vitamins, Minerals,	Nutritional supplement.
ERO PROTEIN (P)	Eros Pharma	Milk proteins, Carbohydrates, Vitamins, Minerals.	Health care product for strength & energy.
TROPHAMIN (P)	Raptakos	Pure protein as calcium casceinate in water dispersible form.	Nutritional supplement with high biological value.
PROTIL (P)	Blue Cross Lab.	Proteins, Carbohydrates, Vitamins with L-lysine, Sodium casceinate as	Food supplement.
SANATOGEN (P)	German Remedies	Pure protein in water- dispersible form	Nutritional supplement, in protein deficiency.
NUTRICAL (B)	Antemis Pharm	Proteins, Fats, Carbohydrates.	Nutritive food supplement.
NURRISH (P)	Eskayef	Soya & milk protein, Veg. oil, carbodhydrates, Vitamins, Minerals & Haemoglobin.	Nutritional supplement.
PROTINULES(P)	Alembic	Casein, SMP, Carbohydrates, Minerals, Vitamins	Health food supplement
G R D (P)	Cadilla Lab.	Milk Protein, Carbohydrates, Vitamins, Minerals, Haemoglobin.	Dietary health food supplement.
ECOPROT (P)	Jenburkt Pharm	Proteins (EAA), Fat, Carboyates, Vitamins, Minerals.	High nutritional health food supplement.
SOYAL (P)	Fairdeal Corporation	Soya proteins, Carbohydrates, Veg. oil, Vitamins, Minerals, Methionine.	Primary & secondary lacto-se intolerance, to animal milk.
PROSOYAL (P)	Fairdeal Corporation	Soya proteins, maltodextrins, Veg. oil, Vitamins, Minerals.	Dietary management of lactose intolerance.
PROMA (P)	Tata Pharma	Soya protein Isolate, Veg. oil, Maltodextrins, Vitamins, Minerals.	Lactose intolerance.
ENRICH (P)	Cadbury	Milk protein, Cocoa solids, Veg. fat, Vitamins, Minerals. Maltodextrins	Gen. health of children, lactating and nursing women.

B = Biscuit, C = Capsule, G = Granule, P = Powder

Production of Malted-Milk Cocoa drinks:

Mixing process:	Magma Mixing
Dry Mix Ingredients:	
Kek Sugar, Cocoa ,	} Preblending before wet mix in Ribbon Blender.
Powder Skimmed	
Milk Powder, Sod.	
bi-carbonate,	
Ethyl Vanillin.	
Wet Ingredients:	{ Malt and liquid glucose in Melangeur, Mixing for 15 min. at about 90°C
Magma Handling:	Melangeur → Pasteurizer → Depositor.
Drying Process:	Vacuum dried in trays at 65 - 70°C for 3 h.
Vacuum Conditions:	22", 25", 29" at different time intervals using steam-ejector pumps.

Malted Milk Cocoa Drink manufacturing

The ingredients are mixed in clean melangeur for 20 min. and the resulting paste is pasteurised in the Hansella at 80 - 82°C. The paste is then deposited into trays and the material vacuum dried in an oven over 3 h.

Properties of the constituents used in health foods**1) Enzyme hydrolysed protein**

It is a partial digest of milk, groundnut or soya protein with papain, pancreatin or microbial enzymes with minimum development of bitterness. It is a concentrated mixture of amino acids, small peptides and polypeptide fractions, which act as softer protein, easy to digest and absorb. It is specially recommended for speciality diet formulations and food supplements for critically-ill patients or those with gastro-intestinal or pancreatic disorders, as an ideal protein-source which is odourless and palatable.

2) Maltodextrins

It is a mixture of polysaccharides produced by controlled, partial hydrolysis of starch by acid or, an enzyme, followed by spray drying. Average dextrose equivalent is in the range 13 to 28. The dextro-maltose powder thus produced acts as simple, carbohydrate source of energy for critically-ill, convalescents, and for those who are in indifferent health due to metabolic disorders. It is much less sweet and does not raise the osmotic pressure of the beverage unduly.

3) Unsaturated oil

High quality oil such as sunflower, safflower or corn oil meeting essential fatty acid requirement; containing 20 to 70% of highly unsaturated linoleic acid, as against 7%

Production of Health Food Supplement:

(Protein concentrate
Vegetable fats
Maltodextrins
Milk/Whey solids
Cereal/Legume
Flour Vitamins/
Minerals
Water) → Mixing → Homogenising → Prectining



Spray or
Roller Drying.

of saturated fatty acids. This acts as a rich-source of essential fatty acids.

4) Vitamins

Both fat soluble and water soluble vitamins are added. These are necessary for proper growth and maintenance of good health. Vitamins also serve to prevent the occurrence or aggravation of deficiency disorders.

5) Minerals

These are provided in dietary, medicinal health food products for performing various specific functions in the body as essential constituents or as soluble salts necessary for the activity of various enzymes. Calcium, phosphorus and iron are the major minerals invariably added. The trace elements added optionally include Mg, K, Zn, Cu, Mn, Mo, I, and F.

Marketing health foods in India

Marketing of any product depends essentially on four cardinal principles, the 4 P's of marketing:

(a) Product design (b) Pricing (c) Physical distribution and (d) Promotion and advertising.

- **Product design:** To produce product and package tailored as per Indian needs. Imitations of products available abroad may not be successful in the country. The taste, flavour and texture of the health foods needed in India may be entirely different from those existing abroad. In India, different parts of the country prefer different taste and flavour and therefore health foods have to be designed accordingly.
- **Pricing:** Pricing of health food products has to be adjusted in accordance with the purchasing power of the public by amending packaging, presentation,

Table 2
Protein Supplements
All India Turnover (Oct 1989-Sept 1990)

<i>Rs in Lakhs</i>		<i>Rs in Lakhs</i>		<i>Rs in Lakhs</i>	
Complan	604	Provitex	2.4	GRD	263
(Glaxo)		(Rallis India)		(Cadilla Lab)	
Sanatogen	18	Spert	195	Ero Protein	8
Protinex	480	Vitaprotein	0.4	Soyal	63
(Pfizer)		(SIRI)		(FDC Ltd.)	
Threptin	165	Protostan	24	Prosoyal	72
(R B & Co.)		(SOL Pharma)		(FDC Ltd.)	
Trophox	72	Prolypo	0.8	Pronutrin	15
(R B & Co.)		(Rallis India)		(CPL Pharmma)	
Cal-750	0.5	Proma	17	Stirrup	1.3
(R B & Co.)		(Tata Pharma)		(Chem. Pharma)	
Trophamin	0.10	Protal	70	Protobex	50
(R B & Co.)		(Abbott)		(Centaur Lab.)	
Proshot	0.6	Protinules	300	Laprotil	18
(R B & Co.)		(Alembic)		(Blue Cross)	
Prosan	71	Alprovit	272	Vimpro	18
(Sandoz)		(Alchem Lab)		Lupin Lab)	
Promolan	0.02	SYU Protein	47	Energex	7
(A. Sarabhai)		(Anglo Prench)		(Indion)	
Nurish	26	Protone	372	Miproten	7
(Eskayef)		(Aristo Pharma)		(PCI)	

etc. There is a relationship between pricing and product/package design. Special health foods are normally packed in sophisticated form and are distributed as high priced commodities.

- **Physical distribution:** It has to be extensive and yet selective in terms of number of outlets. Special health food products could be compared to pharmaceuticals in terms of counter sales. There are about 25,000 outlets in our country. Distribution is to be restricted to major urban centres like metros, class A and class B towns. It is necessary that awareness about the product must percolate down to smaller towns.

- **Promotion & Advertising:** it is better to look for specific segments and go for specialised areas. Health food products need to be reasonably priced.

Success in marketing speciality health foods cannot come in a short-time. It will need time and organization effort for assured success. Speciality health food products are geared towards pharmaceutical industry. Endorsement or recommendation by physicians, has an additional advantage, but it requires advertising, detailing and promotion.

A number of over-the-counter products designed for convalescents or those in indifferent health are in the market. These carry exceptionally high levels of

nutrients like proteins, often accompanied by high dosages of one or more vitamins and minerals. These are consumed in tea-spoon or table-spoon quantities. Quite often they are manufactured by pharmaceutical companies but promoted and sold as nutritional health foods.

Quality Requirements

Raw materials and other ingredients used in the manufacture of protein nutrient supplementary foods shall be of good quality. In particular, the edible oil seed flours and protein isolates, when used, shall conform to relevant Indian Standards. Fats, sweeteners, preservatives, flavours and colours used shall be permitted under the PFA rules and of food quality. It is needless to state that the basic PFA requirements of good manufacturing practice apply to these products.

The product shall conform to the requirements such as moisture, protein, fat, carbohydrates, crude fibre, calories per 100 g. along with TBC/g... 50,000 max. Coliform bacterial count/g... 10 max. Salmonella Sp. ... Nil

Guidelines on Claims

Food labelling is an essential component in all the health food processing industries. The purpose is to tell the consumer about the contents of the food inside the

package or container in correct manner. The label should indicate the ingredients, not contents and other essential points about the health food in the package. It is very important that the declarations and claims made on the label are true and reflect the product packed.

Diebetic claim relates to higher or lower than normal content or the absence of a particular substance and/or physical, chemical, biological or other property of the food, because of that the food is suitable to meet the special nutritional requirements of persons whose digestive process or metabolism are disturbed.

Medical claims relate to the suitability of food for use in the prevention, alleviation, treatment or cure of a disease or symptoms of a disease, disorder or physiological condition.

Nutritional claims relate to the presence of particular substance by reason of which the food may be used in the selection of a balanced diet. Statements of quantity only, as envisaged in nutritional labelling, and, in particular, vitamin and mineral labelling imply such claims.

No food label should contain any claim that may mislead the consumer as to the composition, character or action of a food or as to its suitability for the nutritional purpose for which it is recommended. Exaggerated claims should not be made.

Indian Standard was adopted by the ISI in 1976, finalised by Food Hygiene, Sampling and Analysis Sectional Committee and approved by the Agricultural and Food Products Division Council on code of practice for labelling of prepacked foods— Guidelines on claims.

Nutritional Support and Nutritionally Complete Health Foods available in Western Countries

There are a number of nutritionally complete health foods available in markets of U.S.A. and Europe and their consumption has led to a reduction on otherwise heavy work load in hospitals or in homes (Table 4). Most of these contain nitrogen in the form of free amino acids or oligopeptides. These elemental diets are only appropriate for patients who have diminished ability to breakdown proteins as may be the case in inflammatory bowel disease or pancreatic insufficiency.

A wide range of gastro-intestinal conditions may be associated with significant, nutritional deficiencies such as diarrhoeal states, severe malabsorption, prolonged vomiting, gastro-intestinal surgery, etc. These deficiency states occur much more widely than was formerly believed and may not be clinically apparent in many patients for sometime. Therefore, it is necessary to provide nutritional and metabolic support to patients suffer-

Table 3
Health Beverages
All India Turnover of Malted-Milk Cocoa based Beverage (Oct 89-Sept 90)
Rs in crores

Bournvita (Cadbury)	6.5
Nutramul (Amul)	5.1
Boost (H M M)	4.5
Horlicks (Jagatjit)	7.5
Viva (H. M. M.)	2.5
Maltova (Jagajit)	3.0

ing from gastro-intestinal diseases who largely depend on feeding with elemental health diets.

There has been a tremendous development in the processing technology of health foods in the Western countries in the last few years. India has a large potential in this area and can thus enter the markets inside as well as outside the country provided it adheres to the global quality standards.

Following are the special types of medical health foods products available in Western countries:

1. *LIPEX (AMNI)—[powder/capsules] A Lipotropic nutritional supplement. Area of use: clinical conditions such as lipid metabolic abnormalities, in reducing fat in liver/kidney, in liver cirrhosis & atherosclerosis.*
2. *FIBERPLEX (AMNI)—Powder. Dietary fiber supplement. Area of use: for maintaining proper bowel-regularity, in cholesterol reducing, in easing habitual acute constipation, in detoxifying gastro-intestinal tract and in treating appendicitis and colon-rectal cancer.*
3. *CANDISTAT (AMNI)—Tablets. Dietary food supplement indicated in inhibiting the growth of Candida albicans. broad-spectrum anti-fungal. Area of use: In maintaining intestinal flora with normal ratio of yeast to bacteria, to balance body ecology and strengthen the immune system.*
4. *PGF with Lecithin—(AMNI) Capsule: A garlic formula used in hypertension, atherosclerosis, gastric inflammation, hepatitis, hyperglycaemia and in frequent indigestion.*
5. *POLYCOSE (Ross Lab) Powder—contains glucose polymers. Used in protein intolerance, malabsorption states, hypoglycaemia, and in Na and K restriction.*
6. *CALOGEN (Scien. Hosp. Sppl. Ltd.) — Liquid, used in renal failure or other conditions requiring high energy, low fluid, low electrolyte diets.*
7. *SLIM MANNAN (Asia Health Group): Powder based on natural soluble fibres useful in reducing obesity.*

TABLE 4
Product Brand

Name	Company	Constituents	Clinical conditions
ALBUMAIN(P)	Scientific & Hospital Supplies.	90% Amino acids, Vitamins, Minerals, No carbohydrates No fat.	Malabsorption states when there is failure to hydrolyse and/or absorb proteins.
APROTEN(P)	Ultrapharm	Gluten free, low protein, low Na & K	Phenylketonuria, Liver failure.
FORCEVAL(P)	Unigerg	Calcium caseinate, carbohydrates, vitamins, minerals.	Supplement for short bowel syndrome, inflammatory bowel disease, bowel fistula.
FORMULA-S(P) (WYSOY)	Cow & Gate (Wyeth)	Soya protein isolate, Glucose syrup, Veg.oil, Vitamins Minerals	Milk intolerance, galactokinase deficiency, Lactose Intolerance.
PK-AID-1 (P)	Scientific & Hospital Supplies	All amino acids, except phenylalanine.	Phenylketonuria.
FORTIMEL(L)	Cow & Gate	Protein enriched supplement, Vitamins, Minerals, Low fat, low Na.	Specialised health supplement needing extranutrition with specific dietary needs.
NUTRANEL(P)	Rousell	Maltodextrin, Whey protein, MCT Corn oil, Vitamins, Minerals.	Following total gastrectomy, bowel fistulas, peptic ulcer, anorexia nervosa.
CRITICARE(P/L) (High N ₂ Diet)	Mead Johnson	Meltodextrin, Enzyme hydrolysed casein, Safflower oil, Vit. C. Iron.	Impaired digestion, Inflammatory bowel disease, pancreatitis, short-gut syndrome/ Chemotherapy patients, non-Specific malabsorption/ maldigestion states.
LOFENALAC(P)	Mead-Johnson	Glucose syrup, solids, casein hydrolysate, corn oil, modified starch, Vitamins, Minerals.	Phenylketonuria

P = Powder, L = Liquid

8. LACTAID (Myplan Ltd.) tablets or liquid: based on lactase- enzyme as supplement. Used in primary/secondary lactose intolerance.
9. LECITHINE (FSC): capsules based on soya lecithin. Used as a supplement in ailments such as atherosclerosis and obesity. It is useful inclusion in a calorie controlled diet.

10. PMT-FORMULA (FSC)—Capsules: For women to alleviate various signs & symptoms of premenstrual tension based on Evening Primrose Oil.
11. MAXEPA (Duncan.Flockhart)—Capsules/Liquid based on Omega-3 marine triglycerides used in hypertriglyceridaemia IHD, pancreatitis, rheumatoid arthritis.

(Reprinted from AFST(I) Newsletter, Bombay Chapter, February 1991)

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RAW MATERIAL**265 Super carotene carrot**

A new carrot containing three to five times the usual amount of vitamin A has been developed at the University of Wisconsin, USA.

The new carrot, called Beta III, has 270 ppm of carotene, and has been developed for use in developing countries to help overcome widespread vitamin A deficiency.

The new carrot is claimed to be sweeter than the average carrot, and to taste better. In trials carried out in several developing countries the new attributes have been confirmed. However, some growers have not liked the new carrot's long, thin root since many people prefer a short, fat root. The breeders say that these points can be rectified by further work which will also try to increase the carotene content.

Beta III is open-pollinated and self-propagating, an important point if the crop is to be produced in developing countries.

For further information contact: Dr. Phil Simon, ARS/USDA, Dept of Horticulture, University of Wisconsin, Madison, WI 53706, USA
(*Tech Monitor Mar-Apr 1991, 24-5*)

STORAGE AND INFESTATION CONTROL**266 RCC ring bin**

Indian Grain Storage Institute, Hapur, has developed a RCC Ring Bin, which is constructed from precasted RCC rings, for safe storage of food grains upto one year, with a capacity of storing 40q of grains. It is an outdoor bin. Mild steel reinforcement is provided both in horizontal and vertical direction for casting RCC rings. The edges of the rings are made such that the bottom edge of one ring will sit tightly over the top edge of the ring below. The shape of the joint is such that water cannot get into the bins as the slope is outward. The joints are sealed with cement mortar of 1:2 proportion. Floor is of plain cement concrete of 1:2:4 proportion and it is 75 mm thick. The roof is of RCC with a cement inlet at the top. Roof projects beyond the walls by about 75

mm with a gentle slope from the centre. To cover the inlet, RCC lid is provided. Grain is taken out from a square opening provided at the bottom at ground level covered with a metal sheet. Price Rs. 5000/-.

For further information contact: Indian Grain Storage Institute, Hapur (UP).

(Documentation Bulletin No.83, 1991, 9)

267 Green leaf storage system for tea

The Green Leaf Storage System developed by the Tea Research Association is a first step towards continuous withering of tea. It can be used in conjunction with existing withering troughs. Storage of up to 14,000 kg of green leaf in fresh and undamaged condition is possible even beyond 24 hours. Space requirement for storage of 14,000 kg is only 6'6" x 100' - about the size of a normal withering trough. Chemical and withers can be obtained in this unit and full physical wither by recharging existing withering troughs. Saving of 30-40% on space and power is possible. The machine is very useful for storage of leaf in excess of the withering capacity. It prevents the green leaf from deteriorating until it can be charged into the withering troughs and processed thereafter. The machine is being manufactured by Plamac (India) Pvt Ltd under licence from the Tea Research Association, Jorhat, Assam.

For further information write to: Plamac (India) Ltd., 5B, Rawdon Street, Calcutta 700 017.

(Industrial Products Finder 19(11), 1991, 159)

268 Preserving food with solar energy

Solar energy has been used in a project in Gambia, West Africa, and Tuvalu, the Pacific, to make ice for the preservation of fish and other foodstuffs.

With FAO funding for building costs, these solar powered solid absorption block ice plants were tested in Gunjur, Gambia, and Funafuti, Tuvalu. Both plants had a capacity of 100 kg of ice per 24 hours. On the basis of initial tests some improvements were suggested. But the main conclusion from the project is that a refrigeration system based on a solid absorption cycle is sufficiently reliable to work on locations where specialised operators are not available.

For further information contact: FAO Regional Office, New Quadrangle building, Banjul, Gambia.

(Tech Monitor Mar-Apr 1991, 24)

269 Slow softening tomatoes

Tomatoes, when picked ripe from the vine, can easily rot soon. Farmers pluck the fruit while it is still green, induce to ripen in an atmosphere of ethylene vapour. This method produces a tasteless product.

A collaborative project between England's University of Nottingham and the British chemical giant ICI has developed a tomato genetically engineered to ripen gradually, retaining the natural flavour and juiciness of the fruit.

This was achieved by preventing the production of a vital enzyme, polygalacturonase (PG). Normally, PG breaks down the carbohydrate pectin, a major constituent of the tomato's cell walls.

The new tomato is the result of "antisense technology" a tool employed by biotechnologists. Tomatoes thus genetically modified produce minimal PG. The fruit softens very slowly, while its other ripening features, like sweeteners and colour, develop at the normal pace and the fruit is as safe as unmodified fruit.

For further information contact: Mr Keith Pike, ICI Seeds, Fernhurst Haslemere, Surrey GU27 3JE, UK.

(Asia Pacific Food Industry August 1991, 86-89)

270 Liquid nitrogen extends fruit life

A British company has devised an innovative system that can improve the quality and shelf life of many foods by putting droplets of liquid nitrogen into their packaging on the production line. The London-based BOC company has found that each droplet vaporises almost instantaneously, and as nitrogen expands 700 times in changing from a liquid to gas, it gives a large dilution effect and rapidly displaces most of the air originally in the food pack, to create a controlled atmosphere that will not support life or most microbial action.

The first droplet dispenser machine is being used to package fruit and nut products and extend their shelf life. The technique is also especially suitable for packing coffee, potato crisps, peanuts (in which oxygen in the atmosphere surrounding them can cause rancidity), peanut butter (in which oxidation can cause skinning or colour change), milk products - the flavour and odour of which can be affected by oxidation - cheese, dried potato and other foods that benefit from modified-atmosphere packaging.

Adjustable from a liquid nitrogen volume of 0.003 cc per cycle to 100 cc/cycle, the BOC machine can dispense, stop and restart in response to programmable timer settings and sensing devices that coordinate it with the product packaging rate, up to line speeds of 80 packs a minute. A gas/liquid phase separator ensures that pure, high quality nitrogen, which is odourless, tasteless and inert with food, is supplied.

(Chemical Weekly 36(40), 1991, 100-101)

271 Longer shelf-life for carrots

A chilling process at Isleham Carrot Growers Ltd now combines hydrocooling and chilled air 'hold over' high humidity pressure cooling. The hydrocooler comes from Bieteh Ltd of Slough as do the Airspray pressure coolers which hold the washed and graded carrots until they are packed in trays or polybags.

With this system, during periods of very high ambient temperatures, like those experienced in the UK last Summer, the shelf-life of prepacked carrots supplied to 'chilled chain' customers can be extended by a week, we are assured.

The field heat of incoming produce can be as high as 20 C and the chilling process reduces to 2°C in about 20 minutes, so preventing produce deteriorating whilst being washed, graded, packed and held in storage.

So successful has the equipment been that Isleham have commissioned a similar unit for their subsidiary company in Bordeaux and have ordered one for delivery to Cadiz in Spain.

(Food Trade Review February 1991, 60)

272 A novel insecticide gel for cockroach eradication

An improved approach to the control of cockroaches is being offered by Wellcome in a new product called Maxforce. The result of cooperative product development between Cyanamid and Wellcome Environmental Health, Maxforce is presented in two ready-to-use formulations;

(a) a plastic bait station and

(b) a gel cartridge.

It is virtually odourless and because it requires no wide scale spraying, there is no need to clear areas prior to application. It also reduces the

potential for contamination of operators, non-target organisms and the environment. Its active ingredient is hydro methyionon, an amidino hydrazine slow-acting stomach poison.

This breaks down in light necessitating it within the bait station. It biodegrades by hydrolysis and according to Wellcome, does not leave behind any residues.

(Chemical Weekly 37(37), 1991, 98)

FOOD ADDITIVES

273 Cellulose-derived food gums

Methocel premium food gums are derived from cellulose fiber, a natural carbohydrate. Their main function is to thicken, bind, suspend and emulsify processed foods. They also retain moisture, form films and contribute freeze-thaw stability. In addition, Methocel food gums offer a unique thermal gelatin property and a synergistic relationship with starch. In certain applications, this synergy can allow reduction in starch levels without a corresponding increase in ingredient costs. Applications include bakery foods, frying batters, structured foods, dressings and sauces, soups, frozen desserts, nondairy whipped toppings and more.

(Prepared Foods May 1991, 139)

PROCESSES

274 An enzyme for bread baking

A baking enzyme called Novamyl (a registered trade name) has been recently developed by Nova Nordisk Bioindustrials Inc. (33 Tumer Rd, Danbury, CT 06810 USA).

This enzyme may be used to retard staling and enhance freshness and softness of breads. The enzyme has proved to be effective at dosage levels up to 5-times the amount needed without making the texture of bread gummy.

Recent bakery trials with white pan bread, whole grain breads and hamburger buns demonstrated that three or more days of shelf extension can

be achieved with the use of this enzyme. The enzyme, carbohydrase, made naturally through fermentation, works by modifying starch molecules which results in their ability to retain moisture.

The enzyme is available in granular form and can be added easily to dough water prior to kneading.
(*Chemical Weekly* 37(37), 1991, 98)

275 Edible neem seed oil

After years of research, a young chemist, Dr. Ranjana Gupta claims to have made crude neem oil fit for edible oil purposes. Encouraged by the find, she is contemplating to set up a plant to produce edible oil from minor neem oil seeds in near future.

Crude neem oil cannot be used for edible oil purposes because of its offensive odour, dark colour, and bitter taste. Dr. Gupta, however, claims to have "processed" it to be fit for edible oil purposes.

Since neem is abundantly available in the country, Dr. Gupta hopes to make use of majority of the oil seeds which "otherwise go waste". "We have about 14 million tonnes of neem available today. This would yield about five to seven lakh tonnes of oil seeds, which in turn if tapped for oil would generate about 1.75 to 2 lakh tonnes of oil".

Citing certain other "quantities" of neem edible oil, Dr. Gupta claimed that the "fatty acid composition was superior to palmolein. This edible oil can be easily blended with any other oil, even olive oil, one of the most expensive of edible oils. The deoiled neem cake I get using the process I have developed is also free of any bitter taste, odour and dark colour".

(*Chemical Weekly* 36(42), 1991, 60)

276 New yeast strain to double alcohol output

A new yeast strain developed by Indian scientists promises to double alcohol production and revive the country's 'outmoded' alcohol industry, scientists report.

The new improved strain of *Saccharomyces cerevisiae* can produce alcohol with over 90 per cent efficiency from the raw material, molasses, when provided with optimal conditions. It has been developed using advanced biotechnology by a team of scientists headed by Dr. Tapan Chakrabarti at the Institute of Microbial Technology (Imtech), Chandigarh.

The strain may prove to be a boon to India's 'outmoded' ethyl alcohol industry which thrives more on stringent protection of molasses and price control of the end product.

The new strain produces 12.16 per cent alcohol in about two days compared to commonly used strains that give a maximum of 6-8 per cent alcohol. It also tolerates higher concentrations of sugar and alcohol.

The strain is the culmination of four years of efforts by the Imtech team to genetically engineer a strain of Saccharomyces cerevisiae which could tolerate higher concentrations of sugar in the fermentation both used for alcohol production and also give more alcohol.

The genetic characteristics of the strain were improved through mutations and enrichment techniques. Since it grows very well in high molasses concentrations which are slightly acidic, the possibility of contamination by bacteria is less.

Imtech scientists said they obtained consistently encouraging results in studies conducted in fermenters of 50, 500, 1800 and 2350 litres capacity.

During trials, the strain performed very well with molasses from different sugar factories in Haryana, Punjab, western Uttar Pradesh, Karnataka and Rajasthan.

The technology has been transferred to a private firm and a pilot plant, the second of its kind in Asia, is expected to be commercialised in three to four months.

(Financial Express 19 August 1991, 5)

BY-PRODUCTS AND WASTE UTILIZATION

277 Cheese waste turned into baby food

Australian scientists are using cheese-making waste to improve the nutritional value and digestive properties of baby milk powder.

Researchers at the national science agency, CSIRO, have developed a process for separating a milk protein from whey.

The protein, alpha-lactalbumin, forms around 85 per cent of the whey protein in human milk. Added to baby milk formulae, it largely avoids digestive problems sometimes associated with conventional baby foods based on cow's milk.

CSIRO's Dairy Research Laboratory in Melbourne developed the protein extraction process during research to reduce the environmental problems of disposing of large amounts of whey.

A team led by Dr. John Pearce demonstrated that the protein could be extracted by a combination of temperature and acidity, followed by centrifuge separation.

United Milk Tasmania is cooperating in pilot plant studies to assess commercialisation of the process.

The Dairy Research Laboratory already has a high profile in the world industry. It pioneered mechanised production of cheddar cheese, a technology now licensed to overseas cheesemakers. Its scientists also have devised production techniques for a range of Australian fancy cheeses, including versions of camembert, gouda and fetta.

(P.T.I. Science Service 10(12), 1991, 9)

278 Soft drink from waste whey

Whey, a waste product of the dairy industry, might soon be converted into a tasty soft drink through a new process developed by chemical engineers at the Indian Institute of Technology (IIT) in New Delhi.

The process involves the fermentation of whey with the bacterium Lactobacillus acidophilus.

The researchers believe that several million litres of whey are churned out as a waste product by dairy industries across the country and currently being discarded as waste. Whey has a high biological oxygen demand (BOD) associated with it and, when discarded without special treatment, it adds to pollution. But treatment processes for whey are energy-intensive and expensive.

In the new process, whey is converted into a drinkable product by fermentation to convert part of the lactose content to lactic acid. The process

involves inoculating whey obtained from pasteurized milk, with the Lactobacillus acidophilus at 35°C. The mixture is then left to ferment at 38°C.

In small-scale laboratory tests, the fermentation occurred fast, the reaction completing within six hours. However, with lower microbial mass, the reaction time is expected to increase and side reactions will be minimised. (*Tech Monitor May-June 1991, 26-27*)

279 Manure from distillery spent wash

The environmental protection department in Walchand College of Engineering, Sangli, Maharashtra, has successfully developed a process to convert distillery spent wash into a useful manure. As is well known, spent wash - an offensive smelling effluent from distilleries associated with sugar mills causes serious damage to the environment by not only giving out a foul smell but also by making infertile the soil into which it is let out.

In the new process the spent wash is carried through pipes into specially dug pits near the sugar mills where it is mixed with pressmud - another sugar mill byproduct - along with other available organic wastes.

After about a week, a solid mass forms which is thrown into the open for drying. After another three weeks the solid mass gets converted into an organic manure. The nearby wells or standing sugarcane crops are in no way affected by the production of organic manure and filthy smell emanating out of spent wash is also checked in the process.

The organic manure contains 2-2.5 per cent nitrogen, 1.5- 2 per cent phosphorous and 3.5-4.5 per cent potassium. The fertiliser value of the compost is almost 2 to 3 times more than the traditional farm yard manure.

A private firm, Alfa Laval (India) Ltd., has put up a unit to manufacture this compost.

(*Chemical Weekly 36(41), 1991, 52*)

280 Sorghum straw removes metal contaminants from water

Sorghum (jowar) straw can be used to decontaminate waste water containing heavy metals, according to scientists at Vikram University in Ujjain (Madhya Pradesh).

The scientists from the department of botany investigated the possibility of using this agricultural byproduct alone and in combination with calcium carbonate to remove metals from water.

The researchers D.M. Kumawat and P.S. Dubey said the straw and a combination of straw and calcium carbonate can be used to remove copper, lead, nickel, cadmium and cobalt.

In a series of experiments, the Vikram university scientists used two categories of straw - well-grounded, oven-dried (untreated) straw and washed straw made by boiling the straw and then washing it thrice with distilled water. The researchers found that the material most efficient in removing heavy metals from solutions was activated charcoal, followed by straw (untreated), straw (washed) and calcium carbonate, straw (washed) and teak saw dust.

Calcium carbonate alone also showed a high removal capacity. Untreated straw removed metals about 3 to 26 per cent more efficiently than washed straw while the combination of washed straw and calcium carbonate had roughly 4 to 18 per cent more efficiency than untreated straw.

The ample availability, lower cost and simple technique of use make sorghum straw an important material in heavy metal pollution, the scientists said in their report.

(P.T.I. Science Service 10(16), 1991, 2-3)

PROCESSED PRODUCTS

281 No-nonsense noodles

Japan's Nissin Food Products plans to market "Super Boil" noodles and broth in self-heating cans. The container opens with a conventional metal ring, but there the similarity ends. Wrapped in thermal material, the can prevents heat from escaping while keeping the exterior cool. The heating ingredients are packed into a sealed metal container at the bottom. Nissin doesn't reveal how the device - with ten patents pending - works. All it says is that the process involves the oxidation of complex metals.

Heating is accomplished by removing a plastic coaster from the bottom of the tin and inserting a plastic key. Replacing the coaster causes the key to puncture a thin metal sheet. The can is spun six times, and five minutes later the noodles and broth are a piping 100°C.

For further information contact: Nissin Food Products, 1- 1, Tsukiji, 4 Chome-chuo-ku, Tokyo, Japan.
(*Tech Monitor May-June 1991, 25*)

282 High-grade fiber from potatoes

The Netherlands-based AVEBE recently introduced a new high-grade fiber product derived from potatoes.

Potex offers a large water and fat-binding capacity and is produced with a special refining and drying treatment of the fiber separated during the manufacture of potato starch. Potex contains 75% edible fibers and 8% starch and other carbohydrates.

Potex can be used as a fat substitute in meat and bakery products, reducing their calorie content. It can control boiling losses and fat release in meat products, and when used as an ingredient in deep-frozen products, it prevents water release during thawing and stops disintegration during deep-frying.

AVEBE is marketing Potex in all non-Scandinavian countries.

For details contact: AVEBE, weg 1, 9607 PT Foxhol, Netherlands.
(*Food Engineering International June 1991, 25*)

EQUIPMENT AND MACHINERY

283 Low-cost grain de-huller

Researchers in the Philippines have developed at the International Rice Research Institute (IRRI), Philippines a wooden, manually operated grain de-huller, which is said to be "specially designed for women farm workers".

The device can de-hull paddy, and shell peanuts and coffee beans. It is claimed to be an alternative to the traditional wooden mortar and pestle for threshing grains and to reduce the time and drudgery of de-hulling rice and other grains.

Operated by one person, the device is made of wooden frames, into which the hoppers, roller and sideguards are mounted. The roller is shaped out of wood and wrapped with canvas belt or hard rubber. It is encased by two sideguards and wrapped with canvas material, the sideguards are adjusted to the size of the crop grains to be processed.

Grains are loaded into the hopper and the roller cranked back and forth, thus de-hulling the grains by a shearing action. The de-hulled grains fall into the opposite hopper, from where the grain and chaff are collected for separation.

The cost of producing a unit is put at \$ 15. A lathe, bench drill, welding tools and grinder are needed, also wood, hard rubber, canvas and canvas belt, roll sheets, flat and round bars, nuts and bolts.

For further information contact: Amir U Khan, Agricultural Engineering Department, IRRI, Los Banos, Laguna, Philippines.
(*Tech Monitor Mar-Apr 1991, 24*)

284 Pantnagar dhal mill

GB Pant University of Agriculture and Technology, Pantnagar, has developed a Pantnagar Dhal Mill, for de-hulling and splitting of arhar grains, which has a capacity of 4 q/hr. It is designed and developed for making dhal from pigeonpea, green gram, and lentil. However, it was tested only on pigeonpea grain. The grains are treated to 6% moisture content. The milled product is separated automatically into dhal, broken, powder and husk. The power requirement is 5 hp. The price is Rs. 25,000.

For further details contact: College of Technology, GB Pant University of Agriculture and Technology, Pantnagar 263 145 (UP).
(*Documentation Bulletin No.83, 1991, 9*)

285 Dry destoners

Matcon Engineers have developed air floatation destoners - commonly known as Dry Destoners - for removal of foreign particles from bulk grains, cereals, legumes, spices, and similar other materials, efficiently and reliably.

Based on state-of-the-art technology, these machines work on the principle of densimetric classification by air floatation. Stones, mud-lumps, glass and metallic pieces, etc, are discharged by mechanical vibrations. The machines have high separation efficiency due to primary and secondary separation processes. Matcon Dry Destoners are of international quality and feature compact overall size, high throughput, and low power consumption. Driven by high performance Matcon vibration motors, the machines are simple, quiet-running, and virtually maintenance-free. Full range of throughput requirement is covered by four models having 315, 200, 125, and 80 TPD capacities, roughly corresponding to 15, 10, 6 and 4 T per hour. These machines are best suited for seeds like soyabean, sunflower, cocoa, wheat, mung, urad and other millets, maize, rice, dal and masala. They find applications in roller flour, dal mills; oil extraction, and masala plants; as also in large grain and seed receiving and bagging plants.

For more details write to: Dr Nagarsekar Associates, 2/202 Mehta Park, Bhagoji Keer Marg, Mahim, Bombay 400 016.
(*Chemical Products Finder* 9(12), 1991, 22)

286 Machines for bakery and confectionery industries

Bianchi Angelo and Figi SpA, Italy, offers a wide range of machines for bakery and confectionery industries. Marketed under the brand name Rapida, the range includes: spiral mixers, planetary mixers, twin-arm mixers, fork mixers, volumetric dough dividers, automatic moulding machines for puffed bread, bread dividers, cream cooking machines, egg beaters, semi-automatic and automatic dividers and rounders, rolling mills, sheeters, and automatic production units. Each Bianchi machine is produced from a precise project that is strictly based on the immediate necessities of the market. These machines are available for import by interested parties.

For further information write to: Dhiren and Company, 202 Tranquility 'A', Y-8, Shastri Nagar, Off JP Road, Andheri (W), Bombay - 400 058.
(*Industrial Products Finder* May 1991, 77)

287 Cocoa powder processing equipment

Alpine AG, Germany, offers powder processing equipment for a wide variety of applications. The Contraplex cocoa mills, hammer mills, air classifiers, cyclones and cooling systems are used for cocoa powder production of highest quality and consistency in fineness. The fine impact mills classifiers and jet mills are used for fine grinding of sugar and sugar

substitutes for confectionery and pharmaceutical applications. The equipment can be imported by actual users/projects under OGL on AU licence.

For more details write to: Impetus Incorporated, 47A Vijay Apartments, First Main Road, Shenoy Nagar, Madras 600 030.
(*Chemical Products Finder* 9(12), 1991, 79)

288 Juice extractor with seed collector

United Engineers introduces a triple action Juice Extractor with Seed Collector. It extracts juices, separates pulps and collects seeds in one action. It is suitable for extracting juices of citrus and non-citrus fruits and vegetables. The juice extractor is provided with a stainless steel mesh and motor fitted with thrust bearing, of capacity 400 watts and speed from 14,000 to 16,000 RPM. Three-speed piano type switch with inching facility and auto cutout switch are provided. Can extract more than 60% of the juice.

For further information write to: United Engineers (India), Milap Nagar, Hissar Road, Ambala City, Haryana 134 002.
(*Industrial Products Finder* June 1991, 195)

289 Cooler box

A box designed for keeping products like fresh cream cakes and sandwiches cool during transit has been introduced to meet the new Food Hygiene Regulations.

The stainless steel cooler box will accommodate 18 by 30 in. trays of any depth and can be used to store fresh produce in the bakery or factory, the delivery van or retail outlet. These boxes incorporate eutectic plates and the box itself utilizes CFC-free insulation.

In the case of the bakery business, such a system has the advantage of allowing one to manage without refrigerated vans and still deliver goods that could be warm, like fresh bread, in the same vehicle.

For further details contact: CEA Refrigeration Specialists of Penguin Works, Hinckley Road, Sapcote, Leics
(*Food Trade Review* February 1991, 96)

290 High speed packaging

A new model of microprocessor controlled Form Fill Seal machine introduced by Rovema, Germany, in the recent past has been widely acclaimed in Europe and USA for its high speed and near wear free operation. The machine, VPR-Rotoseal can pack at speeds up to 180 bags per minute, in flat pillow pouches. The VPR employs a patented sealing process wherein a pair of rotary sealing jaws form the cross seal in the bag whilst moving along with the packaging film. The film is thus in continuous motion and need not be interrupted. This has made possible elimination of the clutch brake system and intermittent film motion, both of which contribute to considerable wear. The VPR is suitable for packing all types of products that lend themselves to high speed dosing. Often two conventional FFS machines can be replaced with one Rovema VPR. Acknowledged to be the fastest single tube machine in the world, the VPR truly represents the state of the art in FFS technology. Other advantageous features are versatility in operation, accurate dosing systems, ease of setting up for a new application, fault diagnostics and high machine efficiency. Special high accuracy auger dosers result in considerable product savings through reduced give-away. More than 40 Rovema machines are today working in India on diverse applications such as packaging of milk powder, salt, baby foods, detergent, confectionery, snack foods, pesticides, etc.

For further information write to: Dynatech Marketing Company, 503/F1 Poonam Kunj, Poonam Nagar, Off Mahakali Caves Road, Andheri (East), Bombay 400 093.

(Industrial Products Finder 19(10), 1991, 213)

291 Rigid plastic packaging containers

Sri Hari Engg Company manufactures rigid plastic packaging containers employing vacuum forming/thermoforming process. The firm undertakes designing, development, tooling and production of rigid plastic packaging containers. It also offers to its customers assistance in the development of the overall package, requiring the use of its containers. The products are essentially custom designed. There is also on offer a range of standard food containers and other items. These products are thin walled containers of rigid plastic, mainly HIP and PVC, and are suitable for the packaging of lightweight components and other similar items.

For further information write to: Sri Hari Engineering Co., 9, Suyojana Housing Society, Koregaon Park, Pune, Maharashtra 411 001.

(Industrial Products Finder May 1991, 55)

292 Micro Seam

Food and beverage canners and the aerosol industry will be able to monitor can quality more effectively through an inspection system from Britain. The "Micro Seam" canseam projector, from Purdy Gravfil, allows a cut seam to be examined, measured and even photographed at a magnification factor of 30, to show how it is formed.

Using a 100 W quartz-iodine lamp as light source, the projector gives an instant, clear image of a two- or three-piece cut seam on a fine-grain screen of size 260 x 180 mm. Focus is fixed, no adjustment being needed. The maximum can diameter that can be examined is 304 mm (12 in). A smooth action control knob moves a single vertical cursor calibrated in both metric and imperial units across the image to allow quick and accurate measurement of such features as seam length, overlap, end hook, body hook and countersunk depth.

At each inspection point an exact reading derived from a shaft encoder is given on a digital display; an output connector allows direct transfer of measurements to a computer for archiving or statistical process control. Metric or imperial measurements are selected by a switch. Accuracy is within ± 0.01 mm (0.0004 in). The Micro Seam projector operates from any mains supply from 110 to 240 V. Weight is 12 kg (27 lb).

For further information, contact: Purdy Gravfil Ltd., Henwood Estate, Hythe Road, Ashford, Kent, England TN 24 8DS.
(*Tech Monitor* Mar-Apr 1991, 25-6)

293 Corrosion-resistant cooker

A cooker, which is suitably corrosion-resistant to allow the safe cooking of high salt, low pH sauces, meat products and pie fillings is now available from APV Crepaco Inc. This unit incorporates heavy duty scraper blade agitation, a heat exchange surface, insulation and it is constructed of Inconel 625, although it can be produced in other grades of stainless steel.

Features include multiple steam inlets with external and internal headers to heat transfer surface in the cone portion of the vessel, a removable bridge and agitator, a 30° cone base to allow large surface heating, and counter-rotating variable speed agitation for improved particulate cooking and uniform distribution. The agitation system comprises a scraper blade

and propeller, each of which is separately driven. Additional features include spray devices for CIP treatment as well as a flush-mounted ball valve for improved outlet flow.

For more details contact: West Bryn Mawr Avenue, Rosemont, III 60018, USA.

(Food Trade Review February 1991, 96)

294 Low-cost tray for papain collection

Papain is the powder derived from the milky latex of the immature papaya fruit. Farm Machinery Department at the Tamil Nadu College of Agricultural Engineering in India have come up with a low-cost collecting tray which can be attached to the trunk of a papaya plant.

The low-cost tray consists of two parts of identical/symmetrical design with a flexible and curved sheet metal clamp fixture and a canvas strap by which the two halves of the collection tray are fixed on to the trunk. The papain collection tray is made of 3 mm mild steel rod and takes the form of a pair of rectangular frames.

Inside the frame, nylon or polythene sheeting can be stitched or clipped in; the papain will then be collected only on the sheeting. A canvas strap is provided, thus allowing the pair of frames to provide a lined, horizontal platform.

In the traditional method, heavy aluminium trays are used which are not only costly (Rs. 250 on average), but also involve other difficulties such as additional labour and time wastage in fixing and removing the tray. Another problem in fixing the aluminium tray is the necessity of using bamboo or wooden sticks for support at each corner.

The Tamil Nadu low-cost model is thus an improvement in that it is light in weight (500 gm); is easy to make; the fixing/removal of the tray takes less than a minute; and the approximate cost is Rs. 20.

For more details contact: R. Karunanithi, College of Agricultural Engineering, Tamil Nadu Agricultural University, Coimbatore 641 003, India.

(Appropriate Technology 18(1), 1991, 9)

295 Electroformed nickel moulds for ice candy and kulfi

Prakash Enterprises has developed ice candy and kulfi moulds in electroformed nickel. Compared to conventional copper or brass sheet metal moulds, electroformed nickel moulds have many advantages. There is no leakage because the electroformed nickel pockets have no joints. Cleaning and withdrawal is easy because the nickel pockets have a smooth bright internal finish. They exhibit higher corrosion resistance to cold brine solution, do not require tinning, and permit new and better shapes of lolly to be made.

For further information write to: Prakash Enterprises, 305 near BHEL, Mysore Road, Bangalore, Karnataka 560 026.

(Industrial Products Finder 19(10), 1991, 25)

296 Solar milk pasteurizer

Indian Institute of Technology, Kharagpur has developed a Solar Milk Pasteurizer, for pasteurization of milk. It is a parabolic cylindrical reflector type pasteurizer with a capacity of 20 lit./hr. Heating section is a parabolic cylinder solar collector with mirror strips to concentrate solar rays on a black painted absorber pipe of 5 cm diameter with adjustment for flavour of milk at 20 l/hr and to have milk temperature of 75°C. The whole assembly is covered with glass sheet to check secondary radiation losses. An auxiliary heater is provided for heating milk on cloudy days. The regenerating section utilises the heat of pasteurized milk to heat the raw milk initially. The power requirement is solar energy and electric pump (0.025 hp). The Price is Rs. 1,500.

For further information contact: Post Harvest Technology Centre, Indian Institute of Technology, Kharagpur 721 302 (WB).

(Documentation Bulletin No. 83, 1991, 9)

297 Pulverizers

Unique Enterprises offers Pulverizers in six ranges to suit the production requirements ranging from 2-kg to 1-tonne per hour. Featuring a patented design, these machines can pulverize a wide range of materials and can be easily adjusted to give the required fineness. These low cost pulverizers are sturdily constructed and require little space compared to conventional types. No skilled supervision is needed to operate these machines. User areas include foods and spices.

For further information write to: Unique Enterprises, Moholkar, 67 Saraswati Co-op Housing Society, Near Deendayal Hall, Deendayal Nagar, Nagpur, Maharashtra 440 022.

(Industrial Products Finder 19(11), 1991, 176)

298 Aluminium flooring sheets

Indian Aluminium Company Ltd (INDAL) through close corporate and technological association with the mega international aluminium producer, Aluminium Company of Canada (ALCAN), has pioneered the production and application of aluminium flooring Sheets. INDAL flooring sheets offer three options of surface patterns, chequered (diamond shape), tread (lozenze shape) and 5-bar, all made from time tested high quality aluminium alloys in various tempers. The flooring sheets are made in highly sophisticated rolling mill and each batch is put to rigorous quality control at INDAL's plant at Belur (West Bengal). INDAL flooring sheets are most ideal for breweries, dairies and food processing plants. These abrasion resistant flooring sheets provide a pleasing appearance to all kinds of floors.

For further information write to: Indian Aluminium Company Ltd, Sheet Divn, 1 Middleton Street, Calcutta 700 071.

(Industrial Products Finder 19(10), 1991, 23)

PACKAGING

299 Barrier bags for chilled meat

Trigon, an Australian firm, claims that their new barrier 'Shrinkvac' bag has set new low levels in oxygen transmission. The bag is particularly well suited for the vacuum packaging of chilled meat, extending the shelf-life greatly. Trigon also claim superior abuse-resistance and improved shrink characteristics.

Trigon is currently servicing all Australian states from bases in Sydney, Brisbane, Melbourne. The company has manufacturing plants in New Zealand, the USA and the UK.

For further information contact: TRIGON Packaging Systems, 40, Container St., Tingalpa, QLD 4173, Australia.

(Tech Monitor May-June 1991, 25)

300 Sealing surfaces that contact food

Dunlop Adhesives now has available two FDA-approved materials for sealing surfaces that come into contact with food. R-1140 is a one-part thixotropic acetoxysilicone that can be used either as an adhesive for bonding surfaces or as a sealant against particles penetrating surfaces or crevices. R2-1140 is self-levelling version that allows it to be used for coating or dip-coating.

These transparent sealants can be used on metal, plastics, rubber, ceramics, glass, synthetic or painted surfaces. Apparently, these products will withstand temperatures from -65° to $+240^{\circ}\text{C}$, and are strong and yet elastic.

For details contact: Dunlop Adhesives, Chester Road, Birmingham.
(*Food Trade Review January 1991, 17*)

ANALYSIS

301 Aw value analyzer

Check your water activity in meat and meat products easily with the precision made stainless steel instrument, manufactured in West Germany by Lufft, the world renowned instrument maker.

Complete with all accessories and instructions, ready for use in its Styropercase.

For more details write to: Nicholas Bray and Son Ltd., Holwell, Sherborne, Dorset DT9 5LJ.
(*Food Trade Review November 1990, 588*)

302 Vitamin C determination

A method developed in the CAMAG Laboratories offers advantages to determining the amount of Vitamin C in a certain product. With CAMAG's quantitative thin-layer chromatography there is easy sample preparation which is suitable for routine analysis with large sample throughput.

For details contact: CAMAG, Sonnenmattstrasse 11, CH-4132 Muttenz, Switzerland.
(*Food Engineering International June 1991, 88*)

303 Beating the salt problem

Researchers at the UK's Polytechnic Southwest aim to use advanced technology to overcome an analysis problem caused by the presence of salt in many foodstuffs.

The team is using a technique known as Inductively Coupled Plasma Mass Spectrometry (ICPMS) to obtain fast and accurate analysis of food samples. The method enables up to 60 elements of either safe or potentially toxic substances to be identified in five minutes or less.

The British-made ICPMS instrument uses "flame" (an electrically-excited plasma) at 6,000 degrees K to split a sample into atoms, ionising the components and enabling them to be measured in parts per thousand million.

Now the research team in the Polytechnic's Department of Environmental Sciences has begun a project to devise a method for eliminating the disruptive effects of salt in some food analysis work.

Professor Les Ebdon, one of the team leaders, explained "The salt content of certain food makes it difficult to do rapid and accurate analysis. Technically the salt problem is known as "interference", and in some instances could lead to errors in the test results. We hope to develop a means of removing the interference, during on-line analysis.

(Deccan Herald 18 July 1991, IV)

COMMERCIAL INTELLIGENCE

PRODUCTION (Raw Materials)

304 Production of soyabean seeds ('000 MT)

Year	Production
1988-89	1500
1989-90	1850
1990-91*	2200

*Estimates

(Chemical Weekly 36(48), 1991, 115)

305 All-India final estimates of tuber crops, 1988-89

(Production in tonnes)

States	Potato	Sweet potato	Tapioca	Onion
Andhra Pradesh	3,552	19,900	1,22,600	1,25,600
Arunachal Pradesh	21,931	1,198	5,007	-
Assam	3,45,850	27,327	8,428	11,188
Bihar	14,72,083	2,52,095	-	1,19,977
Gujarat	3,14,500	14,185	-	5,27,900
Haryana	1,42,000	6,433	-	39,525
Himachal Pradesh	1,10,045	-	-	1,589
Jammu and Kashmir	2,834	-	-	29
Karnataka	2,17,331	39,778	13,314	2,74,573
Kerala	-	28,444	28,01,958	-
Madhya Pradesh	3,52,487	38,567	-	2,08,960
Maharashtra	50,925	79,300	-	7,80,900
Manipur	12,120	200	-	-
Meghalaya	71,100	13,200	23,700	-
Mizoram	2,154	914	584	-
Nagaland	500	650	850	650
Orissa	98,880	4,18,400	-	3,09,460
Punjab	5,13,800	461	-	13,120
Rajasthan	28,169	3,203	541	83,717
Sikkim	31,600	-	-	-
Tamil Nadu	1,04,610	50,486	14,77,786	2,20,337
Tripura	54,396	12,319	2,200	244
Uttar Pradesh	66,12,814	2,70,820	-	5,05,039
West Bengal	43,48,094	-	-	-
Andaman & Nicobar Islands	-	286	1,912	-
Delhi	438	438	-	1,342
Pondicherry	-	120	11,079	75

(Agricultural Situation in India February 1991, 795-805)

306 All-India final estimate of oilseeds production, 1988-89

(Production in tonnes)

States	Groundnut	Sesamum	Rapeseed/ Mustard	Sunflower	Safflower
Andhra Pradesh	22,00,600	17,800	831	26,300	5,800
Arunachal Pradesh	-	363	13,324	-	-
Assam	-	7,372	1,54,477	-	-
Bihar	5,048	4,355	63,027	163	98
Goa	1,448	-	-	-	-
Gujarat	28,75,000	88,800	3,29,100	-	-
Haryana	2,200	1,600	4,77,000	-	-
Himachal Pradesh	62	926	2,219	-	-
Jammu and Kashmir	105	2,111	25,775	-	-
Karnataka	10,09,555	77,884	1,894	1,97,686	1,04,835
Kerala	4,749	2,978	-	-	-
Madhya Pradesh	3,35,600	58,200	3,92,900	-	929
Maharashtra	10,05,600	77,500	1,200	1,53,700	3,30,200
Manipur	-	490	1,300	-	-
Meghalaya	-	700	3,400	-	-
Mizoram	-	2,031	-	-	-
Nagaland	600	860	350	-	-
Orissa	5,62,740	1,39,220	71,520	1,100	1,200
Punjab	19,000	5,600	1,60,000	-	-
Rajasthan	2,59,965	61,642	14,39,713	4,816	-
Sikkim	-	-	7,000	-	-
Tamil Nadu	11,04,424	46,565	180	12,880	-
Tripura	1,430	1,350	4,000	-	-
Uttar Pradesh	1,23,356	16,104	9,31,461	13,047	-
West Bengal	27,395	39,440	3,27,060	787	-
Delhi	-	-	728	-	-
Pondicherry	4,600	361	-	-	-

(Agricultural Situation in India January 1991, 699-719)

307 Indian Tea - status

Year/ Season	No of Tea Estates	Area under Tea Hectares	Produc- tion Tonnes	Yield per Hectare Kg	Exports			Sold in Indian Auctions		Sold in London Auctions	
					Qty in Tonnes	Value in Thousand Rupees	Value per kg. Rs.	Retention Tonnes	Tonnes	Avg per kg. Rs.	Avg per kg. Pence
1986	13,546	411,673	620,803	1,508	203,149	580,85,10	28.59	417,654	468,403	23.45	141.9
1987	13,564	414,232	674,302	1,606	201,891	639,24,65	31.66	472,411	472,475	25.12	122.5
1988	-	-	701,087	-	200,956	612,63,97	30.49	500,131	504,475	24.36	125.5
1989	-	-	684,136	-	204,670	824,06,00	40.26	479,466	477,386	36.62	144.8
1990	-	-	714,665	-	199,660	102,87,00	51.50	515,005	482,251	43.24	142.3

(ET Tea Annual 1991, 44)

308 Tea production (India)

	1988	1989	(in tonnes) 1990
NORTH INDIA			
Assam Valley	335,285	342,023	338,562
Cachar	36,460	36,703	41,330
Assam	371,745	378,726	379,892
Darjeeling	11,509	12,689	12,371
Terai	24,090	21,528	25,655
Dooars	115,333	112,726	119,494
West Bengal	150,932	146,943	157,520
Tripura	4,000(a)	4,000(a)	4,000(a)
Others**	2,638	2,633	2,769
Total	529,315	532,302	544,181
SOUTH INDIA			
Tamil Nadu	101,857	91,143	102,594
Karnataka	4,144	3,608	3,865
Kerala	65,771	57,083	64,025
Total	171,772	151,834	170,484
Grand Total	701,087	684,136	714,665

**Including Bihar, Uttar Pradesh, Himachal Pradesh and Sikkim. (a) estimated
(*ET Tea Annual 1991, 48*)

309 Fish production

Fish production during 1990-91 has recorded a new high of 38.36 lakh tonnes as against 36.77 lakh tonnes in 1989-90, says an official release here. While marine fish production registered a modest growth of two per cent, inland fish production recorded a 9.5 per cent growth and the combined growth during 1990-91 is 4.3 per cent.

(*The Economic Times 5 July 1991, 2*)

310 Production of penaeid and non-penaeid shrimp in India

	(Figures in tonnes)		
Year	Penaeid Shrimps	Non-penaeid Shrimp	Total
1986	137,877	74,241	221,118
1987	129,717	69,847	199,564
1988	156,153	80,443	236,598

(*Seafood Export Journal April 1991, 6*)

311 Record foodgrains output again

For the third year in succession, the country is reaping a record harvest of foodgrains. The estimates for 1990-91 have put the total production at

between 176.5 and 177.5 million tonnes. Experts see this positive trend arising from sustained efforts to consolidate the technological and other inputs to further agricultural output.

The record production of about 177 million tonnes of foodgrains is 3.85 per cent higher than the previous record of 170.63 million tonnes achieved last year. The bulk of the contributions to the total output came from kharif crops, which accounted for about 101 million tonnes and rabi crops shored up about 76 million tonnes.

Rice did extremely well both in kharif as well as rabi, and the total production is expected to cross 75 million tonnes. While the rabi crop yielded 67 million tonnes, the rabi/summer crop is likely to bring in another 8 million tonnes. Rice productivity is showing a consistent climb in West Bengal, and other States in the eastern and central regions.

Another significant feature is the record output of pulses after stagnation for a long period of time. It is expected to reach a record 14.2 million tonnes, an increase of 12.6 per cent over the previous year's production of 12.6 million tonnes and 2.53 per cent more than the earlier record of 13.85 million tonnes in 1988-89.

A record oilseeds production of 19.23 million tonnes will be harvested this year. This is 2.48 million tonnes more than last year's production and 1.2 million tonnes more than the figure of 18.03 million tonnes in 1988-89.
(*The Hindu* 21 June 1991, 10)

Production (Industrial)

312 Production of ricebran oil in India

Year	Ricebran processed '000 MT	Edible	Oil production, '000 MT Industrial	Total
1987-88	1940	119	159	278
1988-89	2092	125	176	301
1989-90	2340	141	209	350
Growth rate, % per year				
1980-85	11.20	47.63	9.48	11.37
1986-90	12.27	43.77	3.10	12.57

(*Chemical Weekly* 36(44), 1991, 113)

313 Oil meals production (1986-87) ('000 MT)

Oil meals	Quantity	%
Soyabean	826.4	13.3
Cottonseed	1464.4	23.56
Groundnut	1548.1	24.51
Sunflower	138.4	2.23
Rapeseed	1699.8	27.35
Sesame	163.3	2.63
Coconut	128.2	2.06
Linseed	219.5	3.53
Fish	26.5	0.43
Total	6214.6	100.00

*(Chemical Weekly 36(48), 1991, 115)***314 Soyabean processed and production of soyabean meals ('000 MT)**

Year	Soyabeans processed	Production of Soyabean meals
1987-88	511	415
1988-89	1004	835
1989-90	1218	1020
1990-91*	319	268

* For April, May and June 1990 only.

*(Chemical Weekly 36(48), 1991, 115)***EXPORT****315 Exports of various oil meals**

(Qty. in lakh MT, value in Rs.crores)

Oil meals	1989-90		1988-89	
	Quantity	Value	Quantity	Value
Soyabean	9.30	360	7.50	297
Groundnut	4.30	85	2.59	50
Rapeseed	7.00	89	1.24	18
Ricebran	6.10	63	3.96	37
Sunflower	0.66	10	0.75	10
Others*	1.34	17	0.82	12
Total	28.7	624	16.86	424

*Includes cottonseed, sal, sesame, mango kernel.

(Chemical Weekly 36(48), 1991, 116)

316 Country-wise exports of Indian coffee

Countries	1989-90	1990-91	Countries	1989-90	1990-1991
I. AMERICA					
Canada	556	843	U.S.A.	11,525	3,693
II. EUROPE					
U.K.	246	457	Belgium	1,139	444
France	1,133	955	F.R.G.	7,935	5,091
Italy	7,889	6,229	Holland	885	313
Portugal	168	204	Denmark	106	-
Finland	1,048	1,001	Norway	1,130	215
Sweden	124	-	Czechoslovakia	7,585	1,735
Romania	4,045	1,356	U.S.S.R.	62,598	42,211
Switzerland	922	1,069	Austria	285	-
Yugoslavia	7,948	7,278	Spain	1,112	503
Greece	350	212	Poland	1,459	1,775
III. OCEANIA					
Australia	782	432	New Zealand	447	-
IV. ASIA					
Bahrain	34	4	Iraq	500	-
Kuwait	2,278	601	East Germany	5,063	17,161
Saudi Arabia	108	42	Qatar	18	10
Abudhabi	493	313	Thailand	1	-
Singapore	13	67	Nepal	84	83
Rep. Maldives	19	9	Taiwan	210	-
V. AFRICA					
Egypt	86	153	Jordan	123	258
Total				133,361	90,196

(The Economic Times 19 September 1991 VI)

317 Efforts on to step up tea exports

India produced 2.25 per cent more tea in 1990-91 totalling 718.67 million kg as against 702.81 million kg in the previous year.

According to Commerce Ministry sources, India exported about 199.48 million kg valued at Rs. 1045 crores in the same period with a unit price of Rs. 52.40 as compared with 210.62 million kg valued at Rs. 904.72 crores with a unit price of Rs. 42.96 in the previous year.

Increase in domestic demand for tea and the consequent increase in price of tea in domestic markets vis-a-vis the international price have been responsible for the present stagnating trend for Indian tea export in the international market. The Gulf war was also one of the reasons for decline in the exports during 1990-91.

The Government and the Tea Board have taken a few steps to retrieve the lost share of Indian tea in general currency area (GCA) countries and also to boost tea exports so that it can earn maximum foreign exchange.

The Tea Board to boost exports of value added teas like tea packets, tea bags, instant tea in the developed countries and West Asia, is giving interest-free loans to enable the individual packers to advertise their brands apart from the promotional support.

The rupee devaluation coupled with Exim scrips at the rate of 30 to 40 per cent of free on board (f.o.b.) value are expected to make Indian tea more competitive in the international market and also work as an incentive to export more tea.

Under the new tea unit financing scheme for non- traditional areas, about 415 hectares in Arunachal Pradesh, Orissa, Manipur, Nagaland, Kerala (Wynad district) have been brought under tea plantation so far.

The Tea Board is promoting tea research by giving grants- in-aid to major tea research institutions. Tea Research Association (TRA) in the North-east and UPASI-TRI in the South India have their own well-laid out scientific departments for conducting applied and fundamental research in tea in the specialised fields of agronomy, soil, micro-biology, plant breeding, physiology, biochemistry, plant protection and tea machinery.

(*Financial Express* 4 September 1991, 3)

318 Exports of instant tea from India

(in Kilograms)

	Calendar Years		
	1987	1988	1989
United Kingdom	15,958	7,001	11,150
West Europe	103,925	74,531	105,693
United States	613,412	562,615	760,847
Australia	16,989	12,809	17,574
All Other countries	112,123	134,364	144,523
Total	862,407	791,320	1,039,787

(*ET Tea Annual* 1991, 46)

319 Exports of Packet Tea from India (Excluding Tea bags)

Destination	Year 1980/81			Year 1986			Year 1987		
	Tonnes	Value in Thousand Rs	Value per kg. Rs P	Tonnes	Value in Thousand Rs	Value per kg. Rs P	Tonnes	Value in Thousand Rs	Value per kg. Rs P
United Kingdom	43	16,79	39.05	61	34,82	57.08	28	22,75	81.25
Rest of West Europe	156	70,59	45.25	125	70,59	56.47	76	73,27	96.41
U.S.S.R.	633	2,85,04	45.03	506	2,86,61	56.64	676	3,53,60	52.31
Poland	3,721	8,56,58	23.02	50	15,50	31.00	-	-	-
Rest of East Europe	13	6,87	52.85	3	1,92	64.00	35	19,34	55.26
Afghanistan	815	1,52,43	18.70	8	2,46	30.75	2,053	4,96,79	24.20
Iraq	-	-	-	575	1,31,02	22.79	35	12,88	36.80
Iran	59	16,87	28.59	902	3,28,37	36.40	2,804	11,67,23	41.63
Saudi Arabia	1,792	8,91,93	49.77	2,429	9,53,10	39.24	300	53,61	17.87
Persian Gulf Ports	9,856	16,57,30	16.82	6,957	256,086	36.81	6,489	25,14,86	38.76
Jordan	436	91,56	21.00	121	31,13	25.73	2,457	10,06,77	40.98
Arab Republic of Egypt	1,723	3,17,79	18.44	3,005	7,66,73	25.52	3,698	1,04,776	28.33
Libya	3,300	7,29,30	22.10	2	61	30.50	360	95,96	26.66
Sudan	9,307	17,85,63	19.19	413	1,28,10	31.02	34	7,41	21.79
Rest of Africa	39	18,16	46.56	11	2,69	24.45	51	13,63	26.73
Canada	6	2,06	34.23	14	8,63	61.64	1	65	65.00
U.S.A.	26	10,34	41.69	240	76,19	31.75	593	1,96,46	33.13
Australia & New Zealand	11	5,51	50.09	8	6,22	77.75	23	18,28	79.48
All other Countries	386	83,10	21.53	231	1,06,18	45.97	140	68,78	4.13
Total	32,322	69,98,35	21.65	15,661	55,11,73	35.19	19,853	71,70,03	36.11

(ET Tea Annual 1991, 44)

320 Cashew exports in tonnes from India

Countries	1989	1990	% Variation
Australia	1,858	1,005	-46
Canada	449	212	-53
Czechoslovakia	4,770	1,277	-73
Fed. Rep. of Germany	235	198	-16
German Democratic Republic	404	461	+14
Hong Kong	914	1,058	+16
Japan	3,531	3,712	+5
Kuwait	304	245	-19
Netherlands	14,258	23,894	+68
New Zealand	240	83	-65
Singapore	2,236	1,240	-45
U.K.	610	300	-52
U.S.A.	6,104	4,293	-30
U.S.S.R.	5,915	9,818	+66
U.A.E.	592	267	-55
Total including other countries	43,880	49,553	+13

(*Indian Cashew Journal* 20(3), 1991, 7)

321 US import of cashews in Tonnes

Countries	1989	1990	% Variation
India	15,977	23,687	+48
Brazil	17,551	21,306	+21
Mozambique	2,600	3,261	+25
Tanzania	1,704	960	-44
Kenya	530	275	-48
China	1,004	854	-15
Indonesia	521	645	+23
Others	1,507	3,465	+130
Total	41,394	54,453	+32

(*Indian Cashew Journal* 20(3), 1991, 10)

322 Rise in cardamom exports

The export of large cardamom has risen by 22 per cent during 1990-91 as compared to the previous year's export performance.

According to a press release issued by the Spices Board, the earnings from the export of large cardamom during the period 1990-91 also registered an increase of 46 per cent over the previous year's income.

The total earnings during the last financial year was estimated at around Rs. 4320 million as compared to Rs. 2950 million in 1989-90.

Incidentally, Sikkim is the largest producer of large cardamom and accounts for more than 86 per cent of the country's total production of this cash crop.

(Economic and Commercial News 21(27), 1991, 5)

323 Small cardamom export

Small cardamom in 1990-91 brought in Rs. 10.22 crore in foreign exchange which is 192.8 per cent more than previous year's export earnings.

According to the Commerce Ministry, India exported 379 tonnes of small cardamom in 1990-91, registering an increase of 121.6 per cent over the previous year's exports. Similarly, India exported 787 tonnes of big cardamom in 1990-91 valued at Rs. 4.32 crore.

Small cardamom is produced mainly in Kerala, Karnataka and Tamil Nadu in an estimated area of 105,000 hectares. In 1990-91, 4050 tonnes were produced as compared with 3100 tonnes in the previous year. For large cardamom grown in Sikkim and West Bengal, in 23,730 hectares, the production was 4,500 tonnes in 1990-91.

(The Economic Times 30 August 1991, 5)

324 Efforts to boost cardamom exports

The Government has taken several steps to promote the exports of cardamom from the country.

The steps include brand promotion for cardamom exports to the West Asian countries, provision of air-freight subsidy for exports of cardamom in consumer packs to Middle East destinations as well as monitoring of auction arrivals in order to ensure steady supply of quality cardamom.

(Economic and Commercial News 21(30), 1991, 6)

325 Spice export items expanded

The items required to be exported by importers of spices - cloves and cinnamon/cassia towards fulfilment of export obligation have been expanded by inclusion of celery seeds in bulk, turmeric in bulk, chilly powder in bulk, curry powder in bulk, turmeric powder in bulk, export of all spices/spice products in approved consumer packs.

(Financial Express 20 July 1991, 12)

326 Export of fresh/frozen fish from India

Year	Quantity (kg)	Value (Rs)
1984	1,47,74,000	20,93,66,458
1986	1,17,70,156	19,32,09,067
1988	1,20,74,846	28,32,25,605

(*Seafood Export Journal April 1991, 22*)

327 Country-wise export of frozen shrimp from India 1986-88

Country	(Quantity in tonnes)		
	1986	1987	1988
Japan	33,691	32,521	31,000
U.S.A.	10,462	12,027	12,887
U.K.	4,383	3,929	6,868
France	751	935	839
Belgium	662	563	748
Spain	580	389	788
Netherlands	481	315	741
U.A.E.	438	288	521
Malaysia	188	352	563
Australia	147	189	157
Singapore	146	26	211
Fed. Rep. of Germany	34	11	28
Others*	190	84	622
Total	52,153	51,629	55,973

*Others include Algeria, Mauritius, Canada, Mexico, Sri Lanka, Hong Kong, Thailand, Bahrain, Kuwait, Qatar, Saudi Arabia, Oman, USSR, Portugal, Switzerland, and Greece.

(*Seafood Export Journal April 1991, 11*)

328 Infrastructure available for marine products in India (as on 31st December '89)

Category	Number	Capacity per day in MT
Freezing plants	273	2,094
IQF plants	24	110
Canning plants	27	92
Fish meal plants	29	435
Cold storages	300	41,838
Dried fish storages	426	26,363
Pre-processing units	953	3,255
Insulated/Refrigerated conveyances	483	-

(*Seafood Export Journal April 1991, 12*)

329 Basmati exports

India exported 241876 metric tonnes of basmati rice valued at Rs. 2881.3 million during 1990-91. Of this, exports to the Middle East were worth Rs. 2288.3 million and to West Europe, Rs. 302.5 million.
(*Economic and Commercial News* 21(32), 1991, 6)

330 Export targets for rice, wheat, sugarcane set

The Union Government has set an export target of one million tonnes of wheat, 5,00,000 tonnes of rice and an equal quantity for sugar during 1991-92, the Minister for Food, Mr. Tarun Gogoi, stated while addressing a press conference in New Delhi recently. Besides this, the Government will be able to export an additional 3,00,000 tonnes of Basmati rice which falls under free trade he added.

The Minister also hinted at a review of the sugar licensing norms though no specific changes had been drawn up. Various proposals were under consideration and would be processed before any changes are recommended, he said.

The sugar production up to June-end had touched 11.69 million tonnes and was expected to cross the 11.9 million tonnes mark, he noted. This was against last year's production of 11 million tonnes, and therefore left the Government enough leeway to be able to export 5,00,000 tonnes during the current year, he said.

(*Economic and Commercial News* 21(30), 1991, 4)

331 Processed food export

The recent decision to restrict the 13 categories of processed foods to three, and the revised schedule for CCS rates is not likely to help agro-based industries a great deal unless the industry's other demands are also met, according to the All India Food Preservers' Association (AIFPA).

Since export of processed foods and vegetables fall under the purview of APEDA (Agricultural and Processed Foods Exports Development Authority), which doesn't have enough lobbying powers to put across the demands of the exporters, the association's demands have mostly fallen on deaf ears.

According to the association, the cost of fruits and vegetables are much higher in India compared to the competing countries. This is because fruits and vegetables are brought from local farmers by middlemen at extremely low

rates. This could be rectified to a great extent if cultivable land is allocated to the industry on a 15-year lease since it would eliminate the need for middlemen altogether.

Another alternative is to allocate 50 per cent of the land for captive cultivation. Subject to its success, the lease can be extended in blocks of ten years, and if it is found that the concerned unit is slipping, the land can be withdrawn, since the property rights will remain with the government.

The Centre had fixed 0.5 per cent export cess on agro products without significant amounts of value addition. The customs authorities had included processed foods in the category. The association feels this is unfair, since processed foods and vegetables have one of the highest value additions in the agro-based sector.

In the seventies, the government had introduced a compulsory inspection scheme of processed food exports for which there were no inspection charges. In 1983, a charge was levied for the inspection, which was conducted by the department of food and civil supplies.

The association argues that since there are hardly any complaints from abroad, the procedure should be replaced by self inspection schemes, with the industry not having to bother about quality certificates.

The association also contends that air freights are much higher compared to competing countries like Kenya and Pakistan. Besides air cargo space is not sufficiently available.

It is only after these demands are met that processed foods can do well on the export front, the association feels.

(The Economic Times 21 June 1991, 4)

332 Exports of processed foods

Items	1987-88	1988-89	(Rs. Crores)
			1989-90 (E) Upto Dec 89)
Preserved fruits and vegetables	39.13	51.67	46.00
Fresh fruits and vegetables	92.98	127.45	103.00
Meat and meat products	93.95	117.10	95.00
Other processed foods	120.91	120.86	79.50
Total	346.97	417.08	323.50

(KASSIA Bulletin February-March 1991, 4)

333 New CCS rates for fruit, vegetable products

The Government has announced broad-banding of fruits and vegetable products and revise the cash compensatory support (CCS) rates where export proceeds are received in free foreign exchange receipts, in an effort to encourage export of processed fruits and vegetable products.

The new rates have been made effective from May 15, 1991 and will remain valid till March 31, 1992, according to a news release issued by the Agricultural and Processed Products Export Development Authority (APEDA). Instead of the 13 categories at present, the processed fruit and vegetable products will now be classified in three broad categories.

Under the first category, the CCS rate will be 15 per cent for all types of canned, bottled and packet fruit and vegetable products and all types of frozen fruit and vegetable products.

In the second category, the CCS rate will be 10 per cent for all types of dehydrated fruit and vegetable products, including dehydrated onions garlic flakes/powder and morabbas.

The CCS rate will be five per cent for the third category for processed fruit and vegetable products not specified earlier.

(Economic and Commercial News 21(24), 1991, 5-6)

334 Export information service to be launched

The Developing Countries Trade Agency (DECTA), a British Government funded institution, is joining hands with Industrial Credit and Investment Corporation of India (ICICI) to launch special information services for the Indian exporters. The service, called Export Breakthrough Service (EBS), is proposed to be launched on all-India basis in July next.

The objective of the proposed service would be to assist the exporters initial market research and focus on more attractive markets rather than spread thinly into all the markets. Under the scheme, ICICI and DECTA would grant 25 per cent each of the total service cost and the exporter will have to pay for just the 50 per cent of the balance.

ICICI's contribution towards this would be from the Export Development Fund of the International Bank for Reconstruction and Development (IBRD).

The ICICI assistance would also help the exporter in obtaining, Reserve Bank of India and other official approvals. Exporters who are not obtaining ICICI funds will have to pay 75 per cent of the charges.

According to the sources in the export industry, EBS would help exporters contact market research agencies which would offer four different packages of information to clients. These packages will have detailed market research to identify appropriate market segments and entry channels.

It will also provide names and address of potential importers, fixing appointments, local travel assistance and secretarial help. Follow-up assistance is also planned which will include after-sale visits to buyers for feedback. A pre-launch presentation has already been made to some of the Indian corporate houses who have evinced interest in the service. The companies are ITC group, RPG group, Khatau group, Godrej group, Piramal group, Gabriel India and Standard Organics.

They have also made few suggestions like quick processing of EBS applications, expanding the scope of the service and inclusion of more consultants and countries in the list.

Currently, DECTA has identified nine market research consultants in United Kingdom, Germany, France and Holland. On a long term basis, consultants from Far East nations, Australia and America would be added to the list.

It is proposed that this panel would be constantly enhanced with more consultants from different regions featuring on the list. DECTA has allocated £ 2 lakh for the EBS and it is proposed that an equal amount would be allocated by the Export Development Fund. DECTA has in the past launched other information services and programmes. It has also collaborated with the government of India in 1987 to help increase exports of selected Indian products like footwear, apparel and jewellery.

(Chemical Weekly 36(42), 1991, 84).

IMPORT**335 Cloves import licensing to be revised**

The Government has decided that licences would be granted for the import of cloves and cinnamon/cassia in 1991-92 to past importers to the extent of five per cent of their best year's imports during 1983-84 to 1990-91.

According to a public notice issued by the Chief Controller of Imports and Exports in New Delhi recently, the calculation of the entitlement and minimum value of the licence will be in terms of the earlier notification issued on October 30, 1990.

Applicants are required to produce evidence of the fulfilment of export performance as per the notification issued on December 19, 1990.

The time limit for the fulfilment of export obligation in respect of licences issued during 1988-89 and 1990-91 has been extended to July 31, 1991. A number of documents like shipping bills, bills of entry as well as those concerning export obligation are required to be submitted by eligible applicants.

(Economic and Commercial News 21(28), 1991, 11)

TRADE INFORMATION**336 Pooling coffee stocks**

The small and medium coffee growers of Kerala, Karnataka, and Tamil Nadu have proposed the setting up of a multi-state cooperative to ensure fair prices as an alternative, if the present system of pooling all the coffee grown by the Coffee Board is replaced by an optional pooling system. This system, first suggested by a study conducted by the Indian Institute of Management, Calcutta is being considered by the government.

(Business India July 22 - August 4, 1991, 23)

337 Estimated consumption of Tea, 1991

State	Consumption (Min Kgs)	State	Consumption (Min Kgs)
Uttar Pradesh	45	Bihar	18
Maharashtra	72	West Bengal	38
Andhra Pradesh	25	Madhya Pradesh	32
Tamil Nadu	21	Karnataka	26
Rajasthan	45	Gujarat	61
Orissa	10	Kerala	33
Assam	18	Punjab	45
Haryana	18	Jammu & Kashmir	10
Others	30		
Total			547

*(ET Tea Annual, 1991, 28)***338 Processed food industry dimensions by 1995**

Sector	Present production	(Lakh tonnes) Projected demand
Organised Sector		
Bakery products*	12.590	34.00
Confectionery	0.260	0.37
Fruit and Vegetable products	2.170	7.17
Chocolate	0.080	0.29
Dairy products - processed		
- Baby foods	0.490	0.95
- Condensed milk	0.070	0.12
- Milk powders	0.500	1.27
- Ghee	0.200	0.63
- Ice-cream (lakh litres)	0.090	0.57
- Malted milk food	0.280	0.46
Weaning food	0.090	0.25
High protein foods	0.090	0.17
Soft drinks (million bottles)	1.860	0.17
Beer (lakh KL)	1.990	4.27
Starch and derivatives	1.420	3.16
Instant coffee	0.060	0.20
Meat products	0.180	1.51
Vanaspati	8.700	17.22
Marine products	1.000	2.50
Traditional Sector		
Paste goods	0.200	0.45
Sweets/Snacks	3.200	7.20
Spice powders	0.300	0.36
Vermicelli	0.800	0.97
Poha/Murmura	7.680	9.29

* Also includes production in unorganised sector
(Khadigramodyog August 1990, 440)

339 Controls on vanaspati industry to be reviewed

The Union government has decided to review the entire gamut of control orders which prevail on the vanaspati industry.

This was disclosed by Mr Kamaluddin Ahmed, Union minister of state for civil supplies and public distribution while addressing the annual general body meeting (AGM) of the Vanaspati Manufacturers' Association (VMA).

The minister stated that a study will be made of the repercussions to the industry of the stock control order. Standards of weights and measures (packaged commodities) rules, 1977 and VOP control order. He is of the view that the industry should not be saddled with multiple controls of various government agencies and an attempt should be made to rationalise all regulations.

Mr Ahmed also promised to follow up with the health ministry for amendment of the Food Adulteration Act on two points - the percentage of unsafe matters in ricebran oil and the use of sesame oil in vanaspati manufacture - which the industry claims is the major impediment in the rapid growth of the vanaspati industry.

(The Economic Times 12 August 1991, 8)

340 Potentialities of the tree-borne seeds

Name of oil seed	Seed/kernel '000 MT	Potential oil Yield %	Oil '000 MT
Mahua	190.0	35.0	171.5
Neem	418.0	20.0	83.6
Kusum	90.0	33.0	29.7
Karanja	111.0	27.0	30.0
Sal	5904.0	12.5	688.0
Rubber seed	30.0	18.5	5.6
Mango kernel	600.0	8.0	48.0
Kokum	12.5	40.0	5.0
Undi	18.0	60.0	11.2
Dhupa	30.0	17.0	5.1
Maroti	12.0	33.0	4.0
Pisa	12.0	48.0	5.8
Nahar	5.7	40.0	2.3
Khakan	46.0	33.0	15.2
Total	7379.8		1105.0

(Chemical Weekly 36(44), 1991, 115)

341 Sal seed collection and oil equivalent

Year	Sal seed collection '000 MT	Equivalent oils '000 MT
(1)	(2)	(3)
1985	125	16.3
1986	120	15.6
1987	60	7.8

(*Chemical Weekly* 36(44), 1991, 115)

342 Cashew monopoly procurement policy

The Cashew Export Promotion Council urged the Kerala government to reconsider the monopoly procurement policy, saying the "unrealistic" prices fixed for raw nuts had led to a crisis in the industry.

Addressing the council's 36th annual general meeting here, its chairman, Mr. P. Gangadharan Pillai said the council had urged the Centre in vain to persuade the state government to scrap the policy, which he said satisfied neither the growers nor the processors.

Mr Pillai said the industry sold more than 80 per cent of its production overseas, amidst stiff competition from east- African countries, Brazil and China. The monopoly procurement agency had been able to procure only 58331 mt of cashew as on July 30 this year, which was even less than the previous year's figures of 82672 mt. He stressed the need to step up production of raw cashewnuts, which would also create more jobs.

Mr Pillai said the "indifferent" attitude towards cashew, improper planting and lack of innovative approaches in research were some of the reasons for India's poor cashew output.

On the export performance, he said exports of cashew kernel during 1990-91 went up to 50101 mt the highest during the past decade. Exports registered a growth of more than 11.5 per cent quantitywise and 22.5 per cent value-wise. The Rs. 400 crore target fixed by the government was also surpassed by 10.61 per cent, he said.

During 1990-91 there were considerable exports to USA, Japan, USSR, Singapore, Australia and Hong Kong. Export of cashewnut shell liquid during 1990-91 was 4420 mt valued at Rs. 3.15 crore, as against 3014 mt valued at Rs. 2.53 crore during 1989-90.

Import of raw cashewnuts in 1990-91 was much higher, at 72506 mt valued at Rs. 114.53 crore during 1990-91 compared to 52,474 mt valued at Rs. 72.44 crore during 1989-90.

(The Economic Times 23 September 1991, 4)

343 Quality spices in pouches

The Government of India's Spices Trading Corporation Ltd. here proposes to enter the retail market and sell quality spices in pouches to consumers shortly.

The domestic sales of the corporation declined during 1990-91 to Rs. 596 lakhs from the previous year's sales of Rs. 724 lakhs according to the annual report of the corporation.

The corporation had developed a product, 'elaichi pearls', and launched it successfully in selective markets. It proposes to increase the sales this year.

The corporation procured 173 tonnes of small cardamom valued at Rs. 444 lakhs from various auction centres in Kerala, Karnataka and Tamil Nadu. It also procured another 72 tonnes of large cardamom valued at Rs. 32 lakhs in Sikkim as desired by the Centre.

The corporation has procured 338 tonnes of black pepper valued at Rs. 112 lakhs from the growers and their co-operatives during the year.

It procured spices worth Rs. 152 lakhs against specific orders which included cloves, cinnamon, turmeric whole and powder, ginger powder, chilly whole and powder, coriander whole and powder, poppy seeds, mustard seeds.

(Financial Express 10 August 1991, 4)

344 French knowhow for apple cider processing

India is keen on importing the apple cider processing technology from France. The representatives of the Federation of Indian Chambers of Commerce and Industry (FICCI) and the Confederation of Indian Food Trade and Industry (CIFTI) have expressed this desire to the Chamber of Commerce and Industry of Roven, France. The French side has agreed to give the apple cider processing technology, which they have developed. The French side has also offered mobile processing plants for processing milk, fruit juices, etc. India has been invited to participate in the international trade fair to be organised in Roven in May 1991 this is expected to help the country promote exports and learn more about the French markets.

(Industrial Products Finder May 1991, 112)

345 Apple floor price to be raised

The Union Agriculture Minister, Mr. Balram Jakhar, has agreed to a Himachal Pradesh Government proposal to raise apple support price from Rs. 1.30 to Rs. 2.75 per kg.

Mr. Jakhar said the Centre and the State Government have to share the burden equally accruing to the support price.

However, the Himachal Pradesh Horticulture Minister, Mr. Kunj Lal, has said the increased support price would serve no purpose as the quantity allowed to be procured would hardly benefit over one lakh apple-growers in the State.

(Financial Express 12 August 1991, 8)

346 No proposal to delicense beer

The Government has no proposal to delicense beer and potable alcohol, the Minister of State for Industry, Mr P.J. Kurien, informed the Lok Sabha.

Due to decreased availability of brewer hops, a raw material for beer, from Jammu and Kashmir, a part of its requirement was being met through imports, the Minister told Mr K.V. Thanga Balu in a written reply.

(Financial Express 12 September 1991, 4)

347 Toddy tapping in AP to go on

The sale of toddy in Andhra Pradesh would continue during 1991-92 excise year, beginning from next month, the state health and medical services minister Mr K.Rosaiah informed the state legislative assembly.

(The Economic Times 20 September 1991, 5)

348 DGTD guidance cell

An entrepreneur guidance cell has been set up in the Directorate General of Technical Development (DGTD) to guide the entrepreneurs in the field of chemicals, engineering and allied items.

The cell is intended to make the aspiring entrepreneurs aware of the deficiencies in their proposals and steps to overcome them. It will also help them in the selection of appropriate technology, in identifying the availability of indigenous technology and about the prospects for entering into collaboration, says an official release.

(Financial Express 10 July 1991, 8)

349 CLRI to set up rural abattoirs

The Central Leather Research Institute (CLRI) will soon establish a model slaughter house in a rural area with assistance from the International Development Research Centre, Canada.

Dr G. Thiyagarajan, Director, CLRI, while participating in a workshop on "meat and slaughter house by products handling systems", said the model establishment would be run on an experimental basis for a year and if it proved successful, a chain of rural slaughter houses would be set up.

He said a study conducted in Tamil Nadu, Andhra Pradesh, Karnataka and Rajasthan to identify the strengths and weakness of the present systems of management of meat animals, their marketing and meat production and meat handling systems, had revealed that shifting of meat production from urban to rural areas, where goats and sheep were reared, would make slaughter houses more profitable.

This would also ensure better recovery of by-products like skin, intestines and blood and their processing in rural areas would generate employment opportunities there, he said.

(Financial Express 17 July 1991, 3)

350 Consumer products testing lab

For the first time in the country, a consumer product testing laboratory is being set up by a consumer education and research centre for comparative testing, ranking and evaluation of consumer products and ultimate publication of such findings for consumer education.

The enterprise is taking shape due to the initiative of, and financial assistance by Industrial Development Bank of India, Industrial Credit and Investment Corporation of India and Industrial Finance Corporation of India, providing a capital grant of Rs. 73 lakhs and annual recurring grant of Rs. 18 lakhs for five years.

Initially food, pharmaceuticals and domestic electrical appliances will be tested and brand of makewise findings published and publicised for consumer education. It may also result into action against unsafe products and claims which are not substantiated by laboratory tests.

In scope for future expansion is unlimited in terms of range of products that can be covered.

Consistent with the needs of the time, an industrial and environment safety resource centre will also be housed in the complex.

The Ford Foundation has sanctioned a grant of \$ 1.5 lakh for the said project for two years.

The complex is expected to be ready by April 1992.
(*Financial Express* 22 August 1991, 5)

351 Technological lags in food processing

High prices of raw materials, low productivity and poor development of food processing technology stand in the way of maximising export earnings of the processed foods industry, according to a recent study.

Though India is a major producer of various raw materials like fruits and vegetables, their prices in India are very high compared to other countries. The study conducted by "SBP Consultants" has pointed out.

For example, the international prices of tomatoes are Rs. 300-600 per tonne, those of pineapples Rs. 250-400 per tonne and oranges R. 400 per tonne, their prices in India are Rs.1000, Rs. 1500 and Rs. 1500-1800 per tonne respectively, the study says.

The study blames this on the "present marketing structure" involving a number of middlemen, which pushes up the cost of basic raw materials.

The study holds the present industrial policy, reservation status and other guidelines responsible for the poor development of processing technology.

This has resulted in a dismal image of Indian processed foods in the international markets, it says.

For instance, reservation of items like pickles and other processed foods in the small sector may have the merits of generating employment and development of small entrepreneurship, but their growth would depend upon the demand. The demand, in turn, depends upon prices and qualitative aspects, for which the larger industries are better equipped, the study says.

Further, because of the poor development of processing technology, larger quantities of raw materials are required for manufacture of processed products.

While in countries like Philippines, it requires only eight tonnes of pineapple for producing one tonne of pineapple juice concentrate, in India the requirement works out to 16 tonnes. Similarly, Italy needs only four tonnes of tomatoes to produce one tonne of tomato paste, while India requires seven tonnes, the study observes.

Nor is the situation very happy in semi-finished and finished meat and meat products, it has been pointed out.

Although India is one of the largest holders of live stocks, a number of meat based products are not preferred by importers because of the impression that Indian slaughter houses are unhygienic.

"Barring a few items Indian processed foods industry faces technological lags and it is reflected in higher costs and poor quality when compared with international standards, the study says.

Pointing out that foodgrains and fruits worth more than Rs.6000 crore are lost annually owing to inadequate post harvest technology, the study has observed that there is a serious lack of proper refrigeration, distribution and transportation.

The study has underlined the need to explore markets for new and exotic items like canned mushrooms and dried fruits and vegetables for which there is a good scope in the west.

(The Times of India 17 June 1991, 13)

352 List of industries for automatic approval of foreign know-how agreements:

28. Extraction and Upgrading of Minor Oils

15.12 Sunflowers-seed, safflower or cotton-seed oil, extracted and upgraded.

15.15 Other fixed vegetable oils (minor), extracted and upgraded

30. Soya Products

(i) Soya texture proteins.

210610.00 Protein concentrates and textured protein substances of soya.

(ii) Soya protein isolates 2160690.09 protein isolates of soya.

(iii) Soya protein concentrates. 210610.00 protein concentrates and textured protein substances of soya.

(iv) Other specialised products of soyabean.

(v) Winterised and deodourised refined soyabean oil.

15.07 Refined soya bean oil, winterised and deodourised.

31 (a) Certified high yielding hybrid seeds and synthetic seeds.

(b) Certified high yielding plantlets developed through plant tissue culture.

06.02 Other live plants (including their roots), cutings and slips; Mushroom spawn.

32. All food processing industries other than milk food, malted foods and flour, but excluding the items reserved for small scale sector.

16.01 Sausages and similar products of meat or meat offal;

Food preparations based on these products.

16.02 Other prepared or preserved meat or meat offal.

16.03 Extracts and juices of meat, fish or crustaceans, molluses or other aquatic invertebrates.

16.04 Prepared or preserved fish.

16.05 Crustaceans, molluses and other aquatic invertebrates, prepared or preserved.

19.02 Pasta, whether or not cooked or stuffed (with meat or other substances) or otherwise prepared.

19.03 Tapioca and substitutes therefor prepared from starch, in the form of flakes, grains, pearls, siftings or in similar forms.

19.04 Prepared foods obtained by the swelling or roasting of cereals and cereal products; Cereals, other than maize (corn), in grain form, pre-cooked or otherwise prepared.

20.02 Tomatoes prepared or preserved otherwise than by vinegar or acetic acid.

20.03 Mushrooms and truffles, prepared or preserved otherwise than by vinegar or acetic acid.

20.04 Other vegetables prepared or preserved otherwise than by vinegar or acetic acid, frozen.

20.05 Other vegetables prepared or preserved otherwise than by vinegar or acetic acid, not frozen.

20.06 Fruit, nuts, fruit-peel and other parts of plants, preserved by sugar (drained, glaze or crystallised).

20.07 Fruit jellies, marmalades, fruit or nut puree and fruit or nut pastes, being cooked preparations, whether or not containing added sugar or others sweetening matter.

20.08 Fruit, nuts and other edible parts of plants, otherwise prepared or preserved, whether or not containing added sugar or other sweetening matter or spirit, not elsewhere specified or included.

20.09 Fruit juices (including grape must) and vegetable juices, unfermented and not containing added spirit, whether or not containing added sugar or other sweetening matter.

33. All items of packaging for food processing industries excluding the items reserved for small scale sector.

39.23 Articles for the conveyance or packing of goods of plastics, stoppers, lids, caps and other closure of plastics.

182390.01 Packing and wrapping paper.

(*The Economic Times* 19 August 1991, 3)

FOOD REGULATION, QUALITY CONTROL AND HYGIENE

353 Prevention of Food Adulteration (Sixth Amendment) Rules, 1991

G.S.R 494 (E) - Whereas certain draft rules further to amend the Prevention of Food Adulteration Rules, 1955, were published as required by sub-section (1) of section 23 of the Prevention of Food Adulteration Act, 1954 (37 of 1954) with the notification of the Government of India, in the Ministry of Health and Family Welfare (Department of Health), G.S.R. No. 733(E), dated 23rd August, 1990 in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i), dated the 23rd August 1990, inviting objections and suggestions from all persons likely to be affected thereby till the expiry of a period sixty days from the date on which the Gazette copies of the said notification were made available to the public;

And, whereas the copies of the said Gazette were made available to the public on 7th September 1990;

And, whereas, the objections and suggestions received from the public on the said draft rules have been considered by the Central Government;

Now, therefore in exercise of the powers conferred by sub-section (1) of section 23 of the said Act, the Central Government after consultation with the Central Committee for Food Standards, hereby makes the following rules, further to amend the Prevention of Food Adulteration Rules, 1955, namely:-

RULES

1.(1) These rules may be called the Prevention of Food Adulteration (Sixth Amendment) Rules, 1991.

2. They shall come into force after three months from the date of their final publication in the Official Gazette.

2. In Appendix 'B' to the Prevention of Food Adulteration Rules, 1955 (hereinafter referred to as the said Rules), after item A, 16.12, the following item shall be inserted namely:-

"A.16.12.01 - Soyabean sauce shall be the product derived from any suitable variety of sound and wholesome soyabean, free from insect or fungal or any other blemish affecting the quality of Soyabean. The only substance that may be added are spices, salt, sugar vinegar, acetic acid, onion, garlic wheat molasses and permitted preservatives. It shall not contain any other fruit or vegetable substance. It shall show no sign of fermentation when incubated at 28-30°C and 37°C for three days.

It shall not contain any added colour except caramel.

The minimum total soluble solids shall not be less than 25 per cent, mass/mass as determined by refractometers at 37° C for three days.

The total acidity in terms of acetic acid shall not be less than 0.6 per cent mass/mass.

Mould count shall not be more than 40 per cent of the fields examined.

Yeast spores shall not be more than 125 per 1/60 c.m.m. Bacterial shall not be more than 100 million per c.c.".

[No.P-15013/2/4/89-PHC (P&N)]

B.S. LAMBA, Jt. Secy.

(The Gazette of India Part II-Section 3-Sub-section(i) No.264, 1991)

354 Groundnut oil adulteration

Over 90 per cent of the filtered groundnut oil sold in loose form at retail outlets in Bangalore and Rajkot markets are adulterated with castor oil and in some cases with cottonseed oil.

This is likely to be the situation in the other major groundnut oil producing and consuming States too.

These findings are based on extensive studies carried out by Karnataka Co-operative Oilseeds Growers Federation Ltd. in Bangalore and Shri Rajkot

Lodhika Cooperative Kharid Vechan Sungh Ltd. in Rajkot. These co-operatives undertook the studies at the instance of the National Dairy Development Board.

Most of the samples were drawn from 15 kg. groundnut oil tins. This oil is normally sold loose in smaller quantities to consumers by the retailers. The high incidence of adulteration indicates the extent to which private trade stands to gain by such adulteration.

(Financial Express 22 September 1991, 3)

355 Nickel in vanaspati

The scientists at the Environment Research Laboratory (ERL) Lucknow, (UP), have recently carried out tests to find out nickel content of four leading brands of hydrogenated oil (Vanaspati ghee) widely used in India. They have estimated the nickel content in the product (ghee) by using atomic adsorption spectrophotometry.

The investigators examined 50 samples of each brand of the same batch number and found that the concentration of Ni was 26.5, 23, 26 and 27 ppm respectively. This is toxicologically a very high amount of Ni residue coming from the catalyst used in the hydrogenation process. It is very strange that the manufacturers have so far failed to check this vital parameter for public health. The director of ERL, Dr. M. Saxena, has stated that if an average person consumes 40 g of vanaspati per day, his total intake of Ni will come to 1.06, 0.99, 1.08 and 1.04 mg per day. Nickel is one of the most toxic metal, and yet the Central Committee for Food Standards in India has not yet fixed the threshold limits for this metal for the last 43 years. Also the Prevention of Food Adulteration Act (PFA) has put down to limits and this should be rectified. According to Dr. Saxena, Ni is a toxic metal coming third in the ranking after lead and mercury. Toxicologists refer Ni as carcinogenic. Lung carcinoma of the epidermoid and anaplastic type are the most common, but the highest ratio of cancer is found in the nasal cavities of persons exposed to Ni. Gastric cancer cases have also been reported.

Nickel has been found in a highly chelated form in human tissues and even repeated injections of EDTA fail to lower the content. The international standards on Ni residues in foods are very rigid. For example, 0.1 mg/kg in meat, 0.5 mg/kg in fish, 3 mg/kg in vegetables (USSR standards).

(Chemical Weekly 36(43), 1991, 92)

356 Garlic and cancer

Garlic could prevent some types of cancer, according to new evidence discovered by American scientists. The findings were presented at the annual meeting of the American Association of Cancer Research in Houston last month.

Richard Moon, head of pathophysiology at the Illinois Institute of Technology in Chicago, and his team tested an organo-sulphur compound found in garlic, called diallyl disulphide, on 100 hamsters. They then exposed the hamsters to a carcinogen called methyl nitroso urea. Of a control group which received carcinogen but no diallyl disulphide, 46 per cent developed tracheal tumours. The incidence of cancers in those fed diallyl disulphide in their diet was lower, between 14 and 19 per cent.

A further group of hamsters who were not fed diallyl disulphide but breathed it in as fumes developed far fewer cancers than the control group which was kept in a fumeless room. This matches other research in suggesting that garlic may work when it is directly applied to the site at which the carcinogen is acting, says Carol Detrisac, one of the researchers.

Garlic contains at least 60 different chemicals, many of them sulphides. Michael Wargovich of the University of Texas has studied garlic compounds for the National Cancer Institute in the US as part of its research programme into natural substances that prevent disease. He said: "It's probably one of the first actual food constituents where we have solid evidence that it leads to aspects of cancer prevention."

The attraction of garlic components is their apparent lack of toxicity. Phase one trials, looking at the toxicity of some garlic constituents, have begun, says Wargovich.

The reactivity of diallyl disulphide lies in its sulphur atom. Its electrons are weakly held so they can react with other molecules. Allyl groups enhance this reactivity.

Roger Fenwick, head of the Bioactive Compounds Group at the AFRC Institute of Food Research, and one of Britain's few experts on garlic, said he believes the clue may lie in its ability to form stable free radicals in the body. Diallyl disulphide can split down the middle to form sulphur radicals which are stabilised by the allyl groups.

(New Scientist 22 June 1991, 23)

357 Anti-cancer agents identified in milk cheese

Researchers at the University of Wisconsin (USA) have identified a cancer inhibiting substance in beef, milk and cheese. The substance referred to as 'CLA' is described as isomeric derivative of linoleic acid containing a conjugated double bond system.

How CLA is formed in foods is not yet understood well, but cooking and microbial enzymatic action in cows' rumen are thought to be the major contributors.

The highest CLA content of 9290 ppm was in grilled ground beef. Cheese whiz, a processed food has 5-times as much CLA at 8811 ppm as other cheeses. The high levels of lactalbumin and lactoglobulin in whey may account for these high levels of CLA in cheese whiz. The product is made up of cheddar cheese, low moisture part, skim mozzarella cheese and whey concentrates. Ageing of cheese seems to increase CLA formation.

(Indian Dairyman 43(1), 1991, 37)

358 Starch to replace egg

National Starch and Chemical is replacing the egg yolk in salad dressings with a speciality starch it has developed for cholesterol-free salad dressings using vegetable oil.

A fine powdered starch based on waxy maize, N Creamer 46 stabilizes oil in-water emulsions and also offers a more cost-effective alternative to egg yolk. It is dispersed in the oil phase prior to preparation of the dressing emulsion.

For details contact: National Starch and Chemical, Ashburton Road East, Trafford Park, Manchester M17 1BJ, U.K.

(Food Engineering International June 1991, 24)

359 Making ground meat fat-free and cholesterol-free

Ground meat can be made more healthy and palatable by a simple kitchen procedure reported in the New England Journal of Medicine (Vol. 324, No.2, p.73). The food researchers Donald Small and his colleagues have found that the saturated fat and cholesterol content in meat can be substantially reduced by a simple kitchen procedure.

The ground meat is heated in vegetable oil for about 5 minutes stirring continuously and then allowing the meat to boil in its own juices for an additional 5 mins. The mixture should then be strained to separate the meat and broth. About one to two cups of water should then be poured over the meat to remove any remaining oil and water-soluble material. This liquid should be then mixed with the broth, allowed to cool and refrigerated until the fat solidifies and floats on the surface.

It should then be lifted off like a cake. The stock should be once more mixed with the minced meat and used for cooking.

Researchers found that 43% of the cholesterol and 72 to 87% of the saturated fat content of ground beef, pork, lamb and poultry can be extracted in this way. This simple method of cooking can help people reduce their fat intake substantially.

(Chemical Weekly 36(41), 1991, 100)

TRANSFER OF TECHNOLOGY AND NEW INDUSTRIES

360 Pure Palm's new venture

Pure Palm Ltd., a company belonging to the Metalex Group of Industries, is launching a project at Cochin Export Processing Zone for the production of palm oil. The company has joined hands with Indonesian Government for the joint venture, which will have a capacity to produce 300 tonnes of palm oil per day. For the project, the Metalex Chairman, Mr Suresh Bharadwaj has signed an agreement with the Indonesian Ambassador, Prof Ida Bagus Mantra. The company will be importing about one lakh tonnes of crude palm oil per year for processing into palmolein stearin, fatty acids and other downstream products. The project is incidentally the first Indonesian joint venture in India.

(Chemical Products Finder 9(12), 1991, 111)

361 Orange processing units to be set up

The Maharashtra Government is planning to set up two orange processing units at Nagpur and Amravati with 1,000 tonnes capacity per day.

MAFCO - a State Government undertaking - had been asked to prepare a project report, which was expected to be received within a week, the State Agriculture Minister, Mr Rohidas Patil said.

Mr. Patil told newsmen that each of the plants would have ten lines of 100 tonnes each which could be used according to necessity.
(*Financial Express* 19 September 1991, 8)

362 Pepsi foods may set up spices processing plant

The possibility of Pepsi Co increasing its stake in the Indian venture, Pepsi Foods Private Limited (PFPL), has not been discussed, said Mr Ramesh Vangal, managing director, PFPL, addressing a news conference.

Within the country however, PFPL is considering plants to set up a spices processing project in the Kerala-Karnataka region. Between September 1991 and February 1992, the company would be introducing new snack foods, Mr Vangal stated.

(*The Economic Times* 17 August 1991, 5)

PERSONALIA

-Nil-

COMPUTERISED DATA-BASE SEARCH AT NICFOS

The National Information Centre for Food Science and Technology (NIC-FOS) at CFTRI, Mysore, has developed facilities for computerised "data-base search" of the world literature in Food Science and Technology and related disciplines. Retrospective search-service facility extending upto about 20 years is available on nominal payment basis. Titles alone or with abstracts can be requisitioned as per the needs of the intending users.

Further details can be had from :

The Head
NICFOS
CFTRI
Mysore - 570 013.

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RAW MATERIALS

1 Potatoes-a-plenty

An Australian biotechnology company announced that it has isolated a gene that can make a potato plant capable of producing twice the normal number of tubers. Calgene Pacific of Melbourne now plans further experiments to check for any change in the nutritional content or the cooking characteristics of the genetically engineered potatoes.

If field trials on the plant are successful, the impact on world food production could be considerable. Potatoes, which are grown in about 130 countries, are the world's fourth most important food after rice, wheat and maize.

(New Scientist 26 October 1991, 19)

2 Milking for drugs

Livestock for milk and meat as practised for centuries is likely see a shift is likely to far more lucrative products thanks to the developments in bioengineering. Medically valuable proteins can be produced in cows, and what is even more astonishing, is to get the proteins out in the milk for recovery and purification and therapeutic use. Three teams of researchers have simultaneously announced their success in incorporating the particular human genes into DNA of sheep and cows and regulating the flow of the protein into milk. Some of the proteins are valued at \$ 1,000 per gram and 7 grams per day can be obtained. The efforts are a follow up on the initial studies of putting the gene into mice. Goats were able to produce the Tissue plasminogen activator, TPA, after the appropriate gene was inserted into fertilised goat eggs and implanted into mothers. Only one or two out of many are transgenic and if a male and female transgenic offspring mated some of the progeny produce TPA in the milk. Isolation and purification poses enormous efforts from the gram per litre levels in milk. But it is worth all the effort even if only one pair in a hundred produce and discharge TPA (or other proteins) in the milk.

Another group inserted the gene for human alpha-1-antitrypsin into sheep and five of over a hundred lambs carried the gene and one of these could lactate milk with the antitrypsin. This is valuable for the people who do not make this protein due to genetic defects.

The third effort is also similar but by different techniques for gene insertion. Such cattle-derived drugs are some years away from commercialisation. Even if only proteins are derived in this manner it will be a momentous effort.

(Chemical Weekly 37(4), 1991, 45)

STORAGE AND INFESTATION CONTROL

3 Tomatoes that ripen on demand

Genetics researchers have produced modified tomatoes that take more than twice as long to ripen as ordinary ones. Their work may lead to a wide variety of tropical fruits that stay fresh throughout long journeys. At present, almost one-third of the fruit from tropical countries rots before it reaches consumers in temperate countries.

Athanasios Theologis and colleagues of the Plant Gene Expression Center in Albany, California, part of the University of California at Berkeley, also found that they could make their genetically modified tomatoes ripen simply by spraying them either with ethylene or with propylene.

Tomatoes and other fruits such as bananas and peaches naturally produce their own ethylene to accelerate the ripening process, although the exact mechanism "remains a mystery", write Theologis and colleagues in *Science* (18 October, p. 437). The researchers slowed down the ripening process in the tomato by blocking the production of ethylene through the insertion into the fruit of an "antisense gene".

Antisense genes are artificial strands of DNA that genetic engineers can introduce into the genetic material of plants. The alien "genes" are identical to natural ones that manufacture important biochemicals, such as proteins and enzymes, except that the information in the antisense gene reads back-to-front. Essentially, the antisense gene produces a chemical which interferes with the function of the target gene from which it was originally derived, blocking the real gene's ability to produce its biochemical.

Theologis and colleagues made an antisense gene to interfere with production of an enzyme essential for the manufacture of ethylene in tomatoes. The enzyme, called ACC synthase, catalyses the production of 1-aminocyclopropane-1-carboxylic acid (ACC), the compound from which ethylene is formed. In the altered tomatoes, ethylene production was inhibited by 99.5 per cent.

Ordinary tomatoes ripen fully between 58 and 60 days after pollination. "Antisense fruits kept in air or on the plants for 90 to 120 days develop an orange colour, but never turn red and soft," the researchers write.

The fruit can then be made to ripen at will. "Antisense fruits treated for 15 days with ethylene ripen normally," they write. The investigators also demonstrated that ethylene actually triggers ripening rather than simply turning the tomatoes red.

The achievements at Albany draw on work in Britain led by Don Grierson of the department of physiology and environmental science at the University of Nottingham. Grierson, working in collaboration with researchers at the gene regulation group of the Agricultural and Food Research Council, pioneered antisense gene experiments with tomatoes. However, they focused on different genes to the workers at Albany, preparing an antisense gene to block the enzyme responsible for converting ACC into ethylene.

Grierson says that Theologis's tomatoes showed more dramatic inhibition of ethylene. "His tomatoes stay green for a very long time indeed", he says.

Grierson, who helped ICI to produce a genetically altered tomato that ripens but does not go soft and squishy, said that for reasons that are unclear, the antisense gene introduced by the American team worked better at inhibiting ripening despite being the penultimate rather than the ultimate step leading to the production of ethylene. Grierson suspected that it might be associated with the location of the transplanted gene in the chromosome. (*New Scientist* 26 October 1991, 27)

4 New tech to raise storage life of seeds

A team of scientists at the Botany Department of Gujarat University has found a way to double the average storage life of seeds of cereals, pulses, oilseeds and some vegetables.

The scientists have also found that plant growth regulators (PGRs) are beneficial in increasing vegetative and reproductive growth, as well as the final yield of many field crops and vegetables under field conditions. The technique involves storing the seeds in polythene bags at low temperature and later subjecting them to gibberelic acid (GA-3) treatment.

A senior researcher in the Department, Dr. O.P. Saxena said laboratory tests have shown that seeds of cereals, pulses, oilseeds and vegetables can be

safely stored for almost double the normal period if they are stored in 700 gauge polythene bags sealed with six to seven per cent safe seed moisture at low temperature.

(Chemical Weekly 37(5), 1991, 58)

5 Food containers that stop the rot at sea

Exotic fruits, flowers and vegetables could soon be common place in every corner shop, thanks to new techniques for keeping them fresh in transit. Shipping companies usually send high-value perishables - such as mangoes, kiwi fruits and cut flowers - by air over long distances. But the two new systems developed in Britain and the US can now preserve the cargo long enough to allow companies to send it by sea or land, at about half the cost of air freight.

The key to both systems is to halt or retard the ripening process by altering the atmospheric conditions in large refrigerated containers. Such controlled atmosphere systems are widely used in warehouses but this is the first time they have been used in transit.

Fruits, vegetables and flowers ripen and rot in atmosphere that are rich in oxygen, and both systems are based on methods of flushing it out. Air contains approximately 78 per cent nitrogen, 21 per cent oxygen and 1 per cent other gases.

Last month BOC of Guildford in Surrey unveiled a sophisticated system which tailors the atmosphere to the needs of the particular cargo. It controls independently the levels of carbon dioxide, water vapour, oxygen and ethylene. All four gases contribute to ripening, but ethylene is particularly important. Fruit and vegetables produce it when they respire and ethylene concentrations as low as a few parts per million accelerate the ripening process.

Researchers at BOC and at the shipping agency Freshtainer of Austria found that different conditions suit different cargoes. Mangoes survive best without ripening at 10 C in an atmosphere comprising 10 per cent carbon dioxide, 5 per cent oxygen and 85 per cent nitrogen, with a relative humidity of 90 per cent. Peter Sadkowski, manager of operations and technology at BOC, says that BOC has worked out the optimum conditions for more than 100 different products.

The system relies on four pairs of tubes containing molecular sieves called zeolites that can selectively adsorb gases. Each pair is geared to filtering out

one of the four gases crucial to the ripening process. How much gas each pair of sieves filter out depends on the prevailing temperature and pressure, and these are controlled by computer. The filters come in pairs, so that as one is adsorbing, the other can refresh itself by discharging to the atmosphere outside the storage container.

Air Products of Allentown, Pennsylvania, has also developed a system that relies on a canister of delicate membrane fibres which filter out oxygen. Passing air through the membrane filter increases nitrogen content to 98 per cent. A computer controls temperature and humidity. The fibres were developed by Akzo of Arnhem in the Netherlands.

Both systems can be fitted to existing refrigerated containers. But Robert Heap of the Shipowners' Refrigerated Cargo Research Association in Britain expects the new systems to supplement rather than replace conventional refrigerated transport. "It's a case of wait and see as far as shipping lines are concerned", he says.

(New Scientist 1789, 5 October 1991, 24)

6 Technology for osmotic dehydration of fruits

The Food Technology and Enzyme Engineering Division of BARC has developed osmotic dehydration technique for fruit preservation. This technique will make it possible to store fruits for longer periods.

It preserves flavour and nutritional characteristics and the problem of marketing, handling and transport also becomes much simpler after osmotic dehydration. This new technology will also make fruits available throughout the year. In this technique about 50% of the water from fresh ripe bananas, mangoes, papayas, apples and other fruits can be removed. The final vacuum drying of these osmotically dehydrated fruits provides a good quality product, which has better attributes with respect to appearance, taste, flavour and colour compared to sun-dried fruits.

(Chemical Weekly 36(51), 1991, 108)

7 Sprouting and rotting potatoes

Scientists have found a way to suppress sprouting and rotting in potatoes kept in storage - spray the plants with maleic hydrazide a fortnight before harvesting.

A report in the journal "Indian Horticulture" says spraying with maleic acid before harvesting considerably checks the twin problems of rotting and sprouting in stored potato tubers. The finding may be of help to many farmers fighting hard to stop a bountiful harvest of potatoes from turning into a deteriorating pile.

Sprouting causes excessive physiological losses and the tubers become shrivelled, lose their market value and are susceptible to damage.

Trials conducted at the Potato Research Station, Jalandhar, showed that a foliar spray of maleic hydrazide significantly reduced sprouting in the popular variety "Kufri Chandramukhi" upto six weeks. There was no weight loss either.

However, signs of both sprouting and weight loss appeared by the tenth week.

The tubers were fit for consumption even after three to four months of storage as the maleic hydrazide residue levels were well below the limits.
(*P.T.I. Science Service* 10(7), 1991, 5)

8 Chitosan as a preservative

Crabs, lobsters, shrimps and other shellfish could provide a cheap and abundant raw material for a preservative that extends the shelf life of fruit. Because the preservative is derived from natural sources. It may be more acceptable to consumers than existing synthetic preparations.

Christina Anne Carolan, a researcher at Queen's University, and her colleagues have developed a preservative from chitin, the hard component within the shells of crustaceans. Chitin is second only to cellulose as the most abundant bipolymer in nature.

Carolan and colleagues have chemically modified a derivative of chitin, called chitosan, so that it dissolves in water to form a transparent gel. Apples coated with the gel stayed fresh for at least six months.

Carolan and colleagues make the preservative - which has the chemical name NO-carboxymethyl chitosan (NOCC) - by reacting chitosan with monochloroacetic acid under alkaline conditions. A patented synthesis for NOCC already exists, but the product from this route has only limited application as preservative because it biodegrades after two methods. NOCC

that has been produced using this technique has been approved by the Environmental Protection Agency as a seed coating to increase crop yield. But by varying the reaction conditions, the Irish team succeeded in making the biopolymer with slightly different structure. This type of NOCC had a shelf life of at least six months.

Carolan and colleagues confirmed this by comparing the quality of apples coated in solutions of NOCC made by the two methods with controls. The controls included apples wrapped in newspaper and put in boxes in the garage. The only apples still palatable after six months were the ones coated in the new form of NOCC. They were as fresh as the day they were coated, according to Carolan. Apples coated with the old form survived just 10 weeks.

The new gel is permeable to some gases and vapours but not others. It traps carbon dioxide, which prolongs the shelf life of the apple, and excludes oxygen which rots the fruit.

(Research and Industry 36(3), 1991, 227-228)

9 Honey to replace sulfites

A solution of honey might replace sulfites as a preservative. This follows research work by agricultural scientists in the United States.

According to researchers at Cornell University's State Agricultural Experiment Station, dipping white grapes and sliced fruits in a 20 per cent honey solution before conversion to yellow raisins or dried fruit maintains natural flavour, texture, and colour as efficiently as sulfites, a report in Chemical and Engineering News said.

Food Science and technology professors C Y Lee and Mark McLellan and research assistant Robert Kime say the treatment prevents interactions of enzymes and phenolic compounds with air that cause browning or softening.

This discolouration is not only unappealing, it also produces undesirable off-flavours and can reduce Vitamin-C levels in the fruit.

The researchers have noted that sulfites already have been banned in salad bars and ready-to-use potatoes because they can cause allergic reactions in some persons. In addition, several countries recently announced they will no longer import US yellow raisins because of their high sulfite content.

Dipping fruits in a honey solution appears to be an alternative. The group's future work will include studies of the compounds in honey that prevent browning and extension of the honey-dip treatment to potatoes. (*P.T.I. Science Service 10(20), 1991, 13-14*)

10 Refrigeration threatened

CFC use in the food industry

Application	Current Practice	Available Alternatives	
Fridge freezer	CFC 12 with CFC 11 insulation	HFC 134 with HCFC 123 foam	HCFC 22 fiberglass
Beverage machine	CFC 12 with CFC 11 insulation	HFC 134 with HCFC 123 foam	HCFC 22 fiberglass
Retail food freezer	CFC 502	HCFC 143 a	HCFC 22
Centrifugal	CFC 114		
Chillers	CFC 12	HFC 134 a	HCFC 22
	CFC 11		
	HCFC 22 CFC 500	HCFC 22 HCFC 123	absorption
Frozen	Diesel CFC 12	Diesel	
Transport	with CFC 11 insulation	HFC 134 a	HCFC 22
		HCFC 123 foam	fiberglass

Frozen food is big business in affluent countries of Europe and North America. But the popularity of chilled food, and concerns about CFCs are challenging the food industry in affluent countries. With fears of ozone warming and ozone depletion gaining momentum, some refrigerants have come under the microscope for their potential harmful effect on the environment. But what are the alternatives? The Table above gives a bird's eye view of CFC use and the possible alternatives for food industry. Under the Montreal Protocol of 1987 environmentally unacceptable chloro fluorocarbons (CFCs) are to be phased out by the year 2,000 A.D. because of their assumed association with stratospheric ozone depletion.

There are two aspects to the refrigerant replacement problems - in that an alternative refrigerant must not only be stable, non-toxic, non-flammable and thermodynamically favourable, but it must also have a Zero Ozone

Depletion Potential (ODP) and a minimum Global Warming Potential (GWP). Traditionally, the food industry has used almost the full range of refrigerants available, including CFCs.

This is due to the wide extent of applications which range from the concentration of highly heat sensitive foodstuffs requiring low temperatures and pressures to avoid heat damage and using for example, a refrigerant that boils at about 20 C, to the Individual Quick Freezing (IDF) techniques requiring temperatures down to -40° C.

However, CFCs are not just limited to being the refrigeration working fluid. Most expanded foam insulation is created using CFCs as foam blowers and in the domestic refrigerator, more refrigerant is used in the manufacture of the insulation than in the refrigerator itself. The refrigerant's most commonly used by the food industry are CFC 11, CFC 12 and CFC 502. CFC 11 is used both as a refrigerant and as a blowing agent for insulation. As a working refrigerant, it is typically found in large centrifugal chillers.

Potential short to medium term replacements are HPFC 123, HCFC 123c, HCFC 152 and HCFC 141 b. Long term alternatives include a dimethyl ether E 143 and fluorinated cyclics. The phase out of CFC 11 is expected to have a major effect on the centrifugal chiller, with some 80 per cent of the centrifugal chillers using CFC 11 as a working fluid. Although it would seem that the food industry will bear the full consequence of the changes required by the Montreal Protocol, it should be remembered that there are alternatives available. In the case of CFC 11, the alternatives may require little or no redesign of the plant. However, in general the industry will have to prepare for redesign and re-equipment costs and for higher energy bills. Hopefully, these effects can be reduced because of the research currently being performed in the field of CFC alternatives.

(Chemical Weekly 37(9), 1991, 98-100)

11 Irradiation and proteins in aqueous solutions

The effect of irradiation on food proteins in aqueous solution was studied by researchers Krumhar K.C and Berry J.W. Effects of exposure, headspace gas, buffer, pH, antioxidant, total protein and type and storage were tested.

Decreases in solubility of native proteins and formation of high molecular weight polymers were observed. Destruction was greatest at low protein concentration, high radiation dose (10 kGy) and pH 7. High protein concentration (5-10%), glucose, pH 5.6 and propyl gallate were protective.

Ascorbic acid effects were concentration independent. Nitrogen headspace effect was influenced by antioxidant and was smaller than expected. Propyl gallate plus glucose or SBS helped maintain protein solubility and size at high radiation rates. Marked declines in isoelectric pH consistent with lysine destruction were also revealed.
(*Chemical Weekly* 37(9), 1991, 97)

12 New biocontrol pest against cockroaches

An American company, EcoScience Corp. has found a marketing partner for its natural cockroach biocontrol product currently under review by the US Environment Protection Agency, reports *Biotechnology News*.

Under the agreement, Roussel Bio Corp. gets exclusive US distribution rights for the product and is responsible for field development and product registration. EcoScience will manufacture the product and receive royalties.

The cockroach bioinsecticide works much like conventional bait stations. The insecticide and bait are housed in a plastic container called the Bio Path, which the cockroach enters, thereby becoming infected.

In this case, the insecticide is a natural fungus that infects the bug on contact rather than a chemical insecticide which the insect has to eat. The cockroach brings the fungus back the next where it infects the rest of the colony and kills them all.

Ordinarily, fungi need warm moist environments to thrive, but EcoScience's president James Wylie says the company has had success with the fungus even at very low humidity. Once the fungus is fully grown, it is very stable, according to Wylie.

The current worldwide market for cockroach control products is over 560 million dollars at the manufacturers' level. EcoScience is also working on a Bio-Path system to control filth flies and on products to control weeds and diseases of plants, fruits and vegetables.
(*P.T.I. Science Service* 10(18), 1991, 14-15)

13 Essential oils as fumigants

Research carried out by an Israeli team led by Eli Shaaya of the Agricultural Research Organisation has shown that essential oils extracted from certain herbs and spices by the method of steam distillation are highly active against insects that attack stored food such as wheat and flour.

The research results assume added importance since in recent years the number of chemical fumigants available has dwindled significantly. Methyl bromide and phosphene are still in use but the former is suspected of leaving residues harmful to mammals, while insects seem to be developing resistance to the latter.

Those oils showing activity against insects included such chef's favourites as oregano, basil, rosemary, thyme, anise and peppermint. Plant extracts with little or no activity were celery, cumin, coriander and fennel.
(*Business World* 9-12 October 1991, 12)

FOOD ADDITIVES

14 Sugar sours for Gum Arabic

Gum arabic is the secret emulsifier in a wide range of products, from skin cream to ice cream. It's so good at the job that U.S. firms annually import about 25 million pounds of sticky liquid that is derived from acacia trees, mainly from the Sudan.

But gum arabic's days as a ubiquitous emulsifier may be numbered. Cote, who works at the National Centre for Agricultural Utilization Research in Peoria, Illinois, has isolated an enzyme that converts sugar into alternan, a polymer that may provide a more stable and consistent source of supply than gum arabic.

But several hurdles remain before a new emulsifier hits the market. In a recent edition of *Agricultural Research*, Cote says he needs to enhance alternan's emulsifying ability, perhaps by combining it with other emulsifiers. He also plans to clone the gene for alternansucrase, the enzyme that converts sugar to alternan, to boost production. The cane and beet sugar industries are nibbling at the polymer, Cote says, but "we need to be able to produce alternan a lot more cheaply" before they bite.

(*Science* 11 October 1991, 192)

15 Sugar amides as bulking agents for low calorie foods

At the recent ACS meeting in Washington DC, USA, Monsanto's Nutra Sweet Division unveiled a novel class of non-caloric sugar substitutes that could eventually find use as bulking agents in low-calorie foods, such as frozen desserts and baked goods. The compounds called sugar amides are structurally similar to sucrose, but contain an amide bond that prevents fermentation.

These compounds are only half as sweet as sucrose, they have the appearance and many physical properties of sugar. Nutrasweet envisions applications for their new compounds as bulking agents used alone or in combination with high potency sugar substitutes.

These sugar amides are in pre-clinical trials and will eventually require Food and Drug Administration approval in USA and elsewhere. These compounds will be competing with polydextrose which is now widely used in USA as a bulking agent in low calorie foods.
(*Chemical Weekly* 37(12), 1991, 101)

16 A new anti-staling enzyme for bread

'Novamyl' - an anti-staling enzyme is a new enzyme for bread industry developed by Novo Nordisk Bioindustries Inc. (USA). Novamyl recently passed tests conducted by the American Institute of Baking. The tests showed that Novamyl introduced in late 1990, extended the shelf-life of bread by three days compared to other anti-staling products on the market, while avoiding the gumminess that can result from enzyme overdose.
(*Chemical Weekly* 37(12), 1991, 101)

17 Non-bromate improvers

Mauri Foods, the Food and Fermentation division of the Burns Philp group, has launched a bromate substitute for the bread industry.

Potassium bromate is an oxidising agent and has been used for many years as a dough strengthener and maturing agent.

Based on all available information, there is no single replacement for Potassium Bromate. Finding a suitable replacement was, and is, an extremely difficult task. Bromate gives a superb performance as an oxidising agent and is extremely cost effective.

We have now developed a range of improvers that are excellent replacements for bromated products," said general manager, Keith Bobbermein.

These improvers have been tried successfully in many different situations and are currently providing bakers with bread that is superior in quality to products produced using the bromate oxidising system.

(Asia Pacific Food Industry June 1991, 28)

18 Dried cream

A dried cream extract has a new application in no-fat or low-fat products such as baked goods, desserts and dairy products. It may be used to replace the richness that is lost when fat is taken out of the formulation.

The manufacturer reports that 1 lb of the dried cream extract has the flavour impact of about 40 quarts of cream, yet the fat content is only 13-1\2 per cent. Typical usage level is 1/4 per cent to 1/2 per cent by finished weight of product.

The extract is available from Cumberland Packing Corporation, 1636 Taylor Avenue, Racine, Wisconsin 53403, USA.

(Food Ingredients and Processing International August 1991, 12)

PROCESSES

19 Microwaves for natural product extraction

Microwaves are the basis of a new technique developed by Canadian researchers for extracting natural products such as essential oils, fatty acids, and pigments.

The process consists of disrupting the ultrastructural properties of the material to be extracted by irradiating it with microwaves while immersed in an extractant that is relatively transparent to microwaves.

Microwaves pass freely through the extractant and quickly heat residual water in the inner glandular and vascular systems of the materials to be extracted.

The resulting expansion ruptures the systems, allowing the content to flow freely into the unheated extractant. Ease and speed are the main advantages of the new technique.

A typical extraction of mint essential oil, for example, takes about 30 seconds, compared with more than 90 minutes for comparable yields using conventional steam-distillation extraction. The new technique has been patented.

(P.T.I. Science Service 10(20), 1991, 13)

20 The world's first industrial method for making fats and oils by micro-organisms

Scientists have developed the first industrial method for making fats and oils by microorganisms according to Oramu Suzuki, Deputy Director of Japan's National Chemical Laboratory for Industry (Tsukuba). Suzuki has extracted from fungi a valuable fatty acid, gamma-linolenic acid (GLA), which has a variety of pharmacological uses and was previously only found in a few types of seeds, such as those of the evening primrose.

In this process, genus *Mortierella* fungi are cultured in a flask for a few days, then placed in a jar fermenter containing a sterilised liquid medium for further culturing. After 48 hours, the fungi contain about 50 per cent W/W oil and fats. The culture is centrifuged to remove liquid.

Then the fungi's cell walls are broken down in a ball mill and the resulting solution is filtered to remove the fungi. The filtrate is placed in an evaporator to remove any remaining solution, yielding an oil with a gamma-linolenic acid content of 7-12 per cent. The oil costs \$ 70/kg to produce versus about \$ 210/kg for imported oil extracted from the evening primrose. The technology is now being transferred to various firms for commercialisation.

(Chemical Weekly 37(7), 1991, 91)

21 Solar energy detoxifies water

Scientists at the Lawrence Livermore National Laboratory and the Solar Energy Research Institute in the United States have shown that solar energy can detoxify water.

In their work, contaminated water, in this case containing trichloroethylene (TCE), a suspected carcinogen, is run through narrow, curved glass tube reactors. The curved glass reflects sunlight directly into the reactor.

A photocatalyst is added. The photons from sunlight interact with the photocatalyst to decompose the TCE to a level of less than one part per billion. One advantage claimed is on-site treatment with no need to collect contaminants on carbon or polymers and haul them elsewhere for processing, the journal said.

(*P.T.I. Science Service* 10(20), 1991, 13)

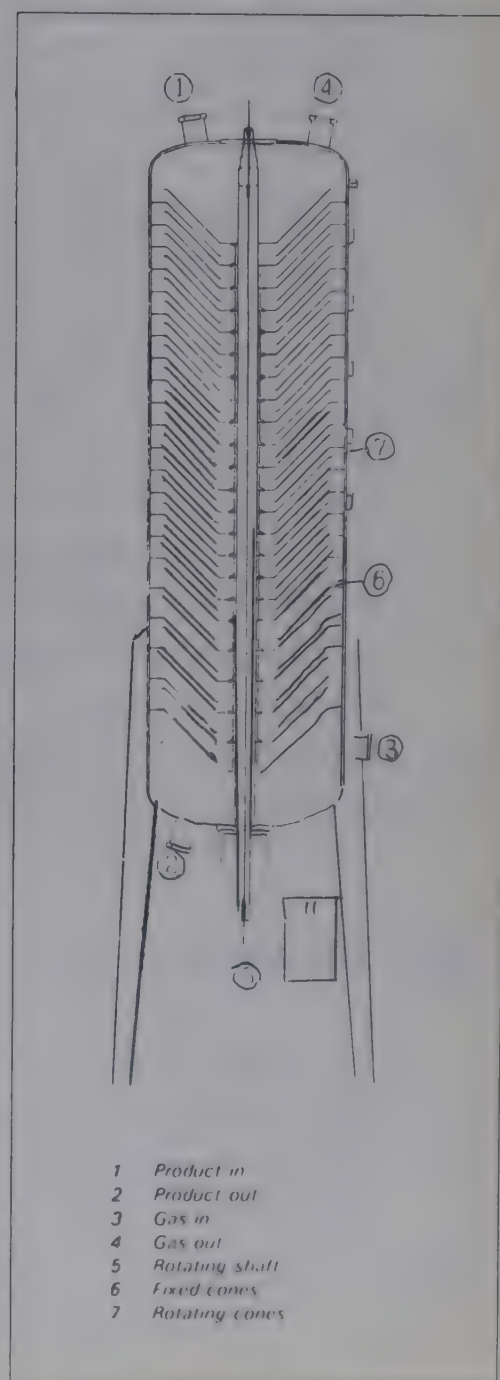
22 Spinning cone technology for flavour volatiles

In April 1990, IPO investors, the parent firm of leading Australian control systems designer, Control Instrumentation, announced an equity participation venture with Flavourtech -a Griffith-based company which had developed an efficient and cost-effective process for the extraction of volatiles from liquid slurries.

The Australian-backed venture gives the new company, Flavourtech, the opportunity to expand domestic and overseas markets for its locally-developed spinning cone column (SCC) molecular distillation process.

Designed in the early 1970's Dr. Don Casimir of the CSIRO Division of Food Processing and commercially developed by Andrew Craig, the SCC has already provided the fruit juices, wine and coffee industries with a more efficient means of essence extraction and addition.

"The product is unique. It has excellent technology and it hit the market at a time when natural essences were indeed the 'flavour of the month'," said Flavourtech's managing director, Trevor Harders.



Mechanical layout of Spinning Cone Column.

Spinning cone technology is currently available for processes like the extraction of aroma from fruit juices, coffee and tea; de-alcoholism of beer and wine, removal of aroma from beer and wine for later addition of low-alcohol products; recovery of natural flavours from vegetables and fruits for addition to prepared foods; and the removal of tainted odours from edible oils.

At least eight systems have been installed, four of which are outside Australia.

(Asia-Pacific Food Industry June 1991, 29)

23 A new fat substitute

Tate & Lyle (UK) have recently unveiled a new fat substitute called Stellar, a modified starch with potential applications from salad dressings to baked goods. The product was developed by A.E. Staley, the major corn refiner in USA, which was taken over by Tate and Lyle in 1988.

Staley should have commercial quantities of Stellar available by early 1992. Approval from the FDA will not be required because the product meets the existing regulations in modified starches. Stellar can replace around 80 per cent of the fat in many applications, which include margarine, sour cream and ice cream. The product has the advantage over Monsanto's Simplex in that it can be used in baked goods. Tate and Lyle reports that there is a \$ 1,000 M/year world market for fat substitutes. In Europe, Stellar will be launched by the Belgian subsidiary Amylum (also known as CST group). Stellar has been under development for 2-3 years. It is made from corn starch powder treated with hydrochloric acid to cleave the molecules. The resulting crystalline powder is 'sheared' with water to produce a 'creme' with fat-like properties and mouth feel. Tate and Lyle has applied for the patents on the process and the product.

(Chemical Weekly 37(3), 1991, 97)

24 Fat substitutes

The greater awareness on health in affluent, advanced countries have given birth to a range of fat substitutes. In an attempt to satisfy consumers, desire for the high fat taste and mouth feel while lowering fat contents, food technologists have developed numerous fat substitutes listed below.

Fat Substitutes

Protein-based Substitute	Sucrose Polyesters	Carbohydrate-based Substitute	Other Synthetic Substitutes
1. Simplesse	1. Olestra	1. Maltrin	1. Esterified propoxylated glycerol (EPG)
2. Trailblazer		2. N-Oil II	2. Dialkyl dihexadecyl malonate (DDM)
3. Lita		3. N-oil and N-Flate	3. Gums, such as guar gum
		4. Paselli SA-2	4. Medium-chain triglycerides (MCT)
		5. Poly-dextrose	

Simplesse, a low-calorie protein-based substitute was introduced in 1988 by Nutrasweet Co. of USA. It is produced by microparticulation of milk and egg white proteins. **Trailblazer** was introduced by Kraft General Foods (USA). It is also made from milk and egg white proteins but the proprietary process is different from that for **Simplesse**.

Lita is a protein-based fat substitute developed by Enzytech Food Ingredients. It is reported to have better heat stability than **Simplesse** and **Trailblazer**.

Maltrin (maltodextrin) was developed by Grain Processing Corp. They have spraydried, nonsweet carbohydrates made by hydrolysing corn starch. They are fully digestible and supply 4 Cals per grain.

N-oil II a tapioca-based malto dextrin developed by National Starch and Chemical Corp (USA). This product as well as **N-oil**, a tapioca dextrin are used in frozen desserts, salad dressings, yoghurts.

N-Flate made from emulsifiers, guar-gum, modified starch and milk solids, can replace shortening and/or egg yolks in baked products.

Paselli SA 2 is a hydrolysed potato starch-based fat substitute. It is recommended for frozen desserts and baked goods as a fat substitute.

Improved Polydextrose developed by Pfizer. It has much better flavour as a partial substitute for fat for use in low-calorie ice creams.

Olestra is a fat substitute patented by Procter and Gamble (USA). Olestra is sucrose polyester, a heat stable, non- asorbable fat made from sucrose and six to eight long chain fatty acids. It is recommended for use in savoury snacks, such as flavoured and unflavoured chips and crisps made from potatoes or corn meal and extruded snacks.

EPG (Esterified propoxylated glycerol) is a low-calorie heat stable fat substitute made by combining propylene oxide with a naturally occurring fat. It was developed by Arco Chemical Co (Newtown Square, Penn). It is in the development stage in collaboration with CPE International Inc, N.J.

DDM (dialkyldihexadecyl malonate) is a thermally stable synthetic fat substitute under development at Frito Lay (Dallas, Texas). It is non-caloric and negligibly absorbed (less than 0.17). It is still in the experimental stage undergoing extensive animal and human safety tests.

Gums, Gums although not direct substitutes for fats, are used as tools in formulating low-fat products. Guar gum, for example, can be an important ingredient because, it picks up and holds water, even through baking and gives softness found in fat, Carrageenan is another gum (derived from seaweed) used in low calorie food formulation.

MCT (Medium chain triglycerides) are esters of fractionated coconut oil fatty acids of chain length 12 carbon atoms or less. They are not non-calorie and provide 8.3 calories/gm.

Unlike other fats, MCT are burned for energy and have a low tendency to be incorporated into tissue lipids to form depot fat. MCTs are generally recognised as safe (GRAS) by the FDA.

Although MCTs have not yet come on the grocery shelf foods, MCT producers are eyeing that market. MCT and structural lipids made from MCT (triglycerides obtained by the hydrolysis and transesterification of MCT and long chain triglycerides) are used in enteral and parenteral feeding fluids and in infant formulas.

(Chemical Weekly 37(3), 1991, 98)

25 Reduction of saturated fat content of meat

The content of saturated fat and cholesterol in meat can be dramatically lowered, without drastically changing the flavour by using a simple cooking

technique, says Donald M. Small, Professor of Biophysics, Medicine and Biochemistry at Boston University School of Medicine, Massachusetts, USA (N. Engl. J. Med., 10 January 1991).

According to Small, the technique reduced saturated fat content by 80% cholesterol by 50% - in contrast, conventional cooking resulted in only about 10% and 3% losses respectively.

The method is essentially an extraction of the fat and cholesterol using vegetable oil. A mixture of ground meat and vegetable oil in a ratio about 2:1 (w/v) is heated to 100-110°C and held at this temperature for 10 minutes. The meat is then strained from the oil and washed once with boiling water. The water extract contains much of the flavour and is added back to the meat. The oil can be re-used several times until the saturated fat content becomes too high.

Small says that the treated ground beef before addition of the water extract is a brown, fully, granular material with a mild meat taste. It can be used after adding the extract to make a range of sauces, casseroles and other meat products.

If the technique were to be used on a commercial scale an outlet for the used oil would have to be found. This might be in animal feedstuffs where tallow is already used or alternatively, the oil might be fractionated to yield higher value products or to recycle the unsaturated fraction for use in further extraction of meat.

The technique, as it might apply to industrial processes for making meat products low in cholesterol and saturated fat, is covered by US patent 49801185.

For further details, contact: Donald M. Small, Department of Biophysics, Housman Medical Research Center, Boston University School of Medicine, 80 East Concord Street, Boston, MA 02118- 2394, USA.
(*Lipid Technology* 3(1), 1991, 4-5)

26 Process for preparing unwrinkled green pepper

The Regional Research Laboratory (RRL), Trivandrum, has developed a novel process for the preparation of unwrinkled green pepper from immature fresh pepper.

The process involves the inactivation of poly-phenoloxidase enzyme by boiling water blanching as an initial step. The product is then subjected to a temperature processing for a few hours and dried by conventional drying method at a temperature reasonably above the ambient condition.

The product is green in colour, crisp does not undergo volume reduction and regains almost the original fresh appearance when hydrated. This value-added product can find good export market as the demand for naturally appealing products, without chemical treatments, is increasing in general and for flavouring materials like spices, in particular.

(Research and Industry 36(2), 1991, 146)

27 A unique method for papain production

A joint venture between two Belgian firms, ICC and Traditec, has developed a new method of producing papain which could be of immense use to the pharmaceutical industry. Under this new method, which uses freeze-drying technology, the papain produced has increased proteolytic activity (more than double), is completely soluble and is 100% free from pathogenic germs. Thus, the pharmaceutical industry need no longer employ the costly process of papain purification.

Papain is extracted industrially from papain latex, the juice of papaya tree. It is used mainly in the food, pharmaceutical and cosmetic sectors.
(Business World 18-31 December 1991, 32)

28 A new water-soluble antioxidant developed from sunflower seeds for foodstuffs

A new efficient water soluble antioxidant developed for use in foods, is derived from sunflower seeds. It has a higher degree of activity, heat resistance and solubility than other antioxidants on the market. Dubbed 'Heliant', it is obtained by refining and formulating natural ingredients contained in sunflower seeds. The ingredients serving to prevent oxidation are vegetable polyphenol etc.

Heliant is more effective than L-ascorbic acid - a prevalent water soluble antioxidant - and catechin (a tea source antioxidant). Heliant can also maintain effectiveness longer than other equivalents.

It is mixed with food materials or foodstuffs themselves. Heliant is yellow brown, but as it is used in diluted solution (100-200 ppm) it is almost

colourless and odourless when employed. It is the natural water soluble antioxidant. The company expects to develop good market for the product as an anti-oxidant in processed fishery products, processed meat products and frozen vegetables.

(Chemical Weekly 36(52), 1991, 97)

29 Freezing crab meat with nitrogen

Work is being carried out in the USA on freezing crab meat with nitrogen which can produce a more moist, less salty product than the brine frozen product. The crab is also said to have a fresh flavour. Nitrogen frozen crab-meat was found not only to be more moist but also less fibrous in texture.

The cost of nitrogen freezing is estimated to be between \$ 0.03 and \$ 0.05 per pound of crab meat.

Nitrogen-frozen crab meat is already being sold by a Japanese company in the domestic market, but has not yet become popular in Europe. It may now be more widely adopted in the USA.

(Food Ingredients and Processing International August 1991, 12)

30 A novel fermenting process for cocoa beans

Nestle has sought to patent a new improved process for the fermentation of Malaysian cocoa beans in the UK. Under this process, the company claims, the beans have low acidity and have an enhanced cocoa flavour.

The fruit of the cocoa tree consists of a pod containing about 35 seeds (the beans) coated with a sweet pulp. Usually the beans are simply fermented with the pulp and dried. The fermentation is the key to the colour, flavour and aroma of the beans.

The new method involves pre-treating the fresh cocoa beans to reduce the amount of pulp. This is done by either passing the beans through a paddle depulper several times or using a hydraulic press. Typically, the pulp is reduced by 80%. The beans are then predried to remove pulp moisture and fermented upto five days. The success lies in pulp reduction which allows fermentation to take place under highly aerobic conditions, thus favouring acetic acid bacteria over lactic acid bacteria activity.

(Business World 18-31 December 1991, 32)

BY-PRODUCTS AND WASTE UTILIZATION

31 Enzymes from fish waste

Fish could become in future an unexpected source of hydrolytic enzymes for use as processing agents in the food and other industries. The Bergen Group of Norway recently isolated and purified several enzymes from pyloric coeca and using standard centrifugation, precipitation and chromatography technique that could be readily adapted for large scale production in the future.

A minimal degree of mincing extracted the enzymes with final recoveries of 60-90 per cent. The enzymes studied so far, isolated to electrophoretic purity, include deoxyribonuclease (Dnase), chymotrypsins and elastase. All are active at alkaline pH values and have different isoelectric points from their homologues in other species.

(Chemical Weekly 37(13), 1991, 101)

PROCESSED PRODUCTS

32 New whisky

Jagatjit Industries Ltd has recently launched Executive Club Whisky in Bangalore.

The whisky is targeted at young executives and claims to be the right choice for them. Executive Club falls under the regular whisky segment and will compete with Officers Choice, Director's Special and Bag Piper Whisky.

(Financial Express 16 October 1991, 8)

33 Dry beer introduced

Arlem Breweries, which is part of the Chowgule group, has for the first time introduced a dry beer in the country.

Conventional brewing practices leave a residue of sugar which makes the beer heavy and masks the true 'beer' flavour. Arlem's new process ensures all the sugar is fermented so there is no heavy after taste and the true flavour of hops and malt can be appreciated.

(The Economic Times 23 November 1991, 3)

EQUIPMENT AND MACHINERY**34 Contact plate freezer for batched foods**

The Contact Plate Freezer efficiently handles batched packages of food where space is limited. It is designed with flat freezing plates that rapidly freeze the food to assure high product quality and maintain product colour, texture, and flavour. This freezer causes virtually no food-cell damage. Features include a hydraulic pump unit, a top pressure plate with even hydraulic pressure distribution, contact plates that provide uniform heat extraction, and insulated doors.

For further information write to APV Crepaco, Inc, 9525 W Bryn Mawr Ave, Rosemont, IL, 60018, U.S.A.
(*Industrial Products Finder* 20(2), 1991, 43)

35 Portable centrifuge

D.Parikh who are well-known for their centrifuges, now manufacture a portable centrifuge. This centrifuge has all the features of a conventional top discharge machine. It is mounted on a trolley provided with castor wheels to enable to move this machine from plant to plant or vessel to vessel for taking small batches for trial or production. Although the machine is mounted on a trolley, to minimise vibrations rubber pads with a screw system are provided to fix the trolley at one place.

For further details contact: D.Parikh Engineering Works, 115, Marol Coop. Indl. Estate, M.V. Road, Near Sakinaka, Bombay 400 059.
(*Chemical Weekly* 37(7), 1991, 107)

36 Formula flour blending and mixing

The trend forecasts for the milling industry in the years ahead point towards the application of new machinery with high degrees of automation to solve two lingering problems: low product flexibility and high operational costs.

In flour silo technology, 'formula blending' of flours - a flour production process which allows the matching of ready-to-sell flours to each particular customer's requirements, with regard to protein, colour, granulation, maltose, ash and water absorption capabilities - will take prominence.

'The formula blending' process is characterised by a proportioning and mixing system for the basic flours, gluten and creta and the additives, the quantity of which is controlled via the formula input. It is therefore possible for the mill to blend, for example, 200 g of potassium bromate with 1000 kg of flour to such a homogeneous mix that in every sample of 100 g drawn, 0.02 g of the oxidising agent will be found.

The basic plant diagram Major ingredients like flours, starch and sugar are supplied in bulk and stored in bins of the appropriate size, while the minor and micro ingredients like salt, whey-powder, gluten, buttermilk, sodium bicarbonate and dried egg, are supplied in bags and boxes and tipped into smaller hoppers. The accurate proportioning with various scales is according to recipe.

A paddle rotor mixer mixes the dry ingredients. Oil or liquid fat is also proportioned and sprayed onto the dry mix. After the required mixing time, the batch leaves the mixer and passes through a finisher, which dissolves lumps and produces a homogeneous product. If the fat content of the mix is high, conveying can be difficult. A way to solve this problem is to pack the products directly below the finisher, preferably with an electronically controlled gross weight packer.

The addition of liquid fat by weight is the best way to get a product of evenly distributed fat content. (The continuous spraying of oil onto a volumetric stream of product is no doubt less costly, but there is no guarantee of achieving a homogeneous mix).

The addition of plastified fat, i.e. butter or margarine, can also be automated, but compared to a system of liquid fat, much higher expenditure has to be expected.

This system is ideal for automation, but there is no exclusive control philosophy for a plant like this.

Advantages: This system also has substantial advantages for a plant in which flours are blended on a volumetric basis:

- High uniformity of mill products: The production of basic flours allows the grinding of large lots of identical wheat grists.

- Saves money and time, and eliminates human errors: The electronically-controlled weighing of ingredients ensures minimum deviation from the target weight so that even when lower quality products are used, the risk of flour falling short of the required quality standard is eliminated.

- Bigger market: Individual customer's requirements are taken into consideration without much additional expenditure.

Operational flexibility: Incoming orders can be processed with the blending and mixing system and immediately loaded, with no additional work.

(Asia-Pacific Food Industry June 1991, 48-49)

37 Microwave oven for industry

Food processing industry will have the opportunity to reduce costs and increase efficiency by employing an industrial version of the microwave oven developed by Prof Nguyen Tran of Deakin University, (Geelong, Victoria, Australia).

Uses for the tran microwave heating system include baking bread, pasteurising milk, roasting cocoa beans and sterilising cream. It is also used to cook mussels. The unit can be modified or fine-tuned to cope with most tasks in the food or liquor industry that require heating or pasteurisation of ingredients.

The potential for microwave power for a wide range of industrial applications is only being realised. Microwave units are reported to be safe, efficient and highly cost effective, cutting millions of dollars from manufacturing costs. This microwave system can process products which can be carried by conveyor or pumped through the core, including liquids, slurries or granular products. It can be adopted to work relatively easily in a controlled atmosphere - pressure vacuumed or steam.

(Chemical Weekly 36(52), 1991, 98-99)

38 Pulse combustion technology to replace spray dryers

Bepex Corp. (Minneapolis, Minn, USA) has developed a novel dryer for heat sensitive materials such as pharmaceuticals and food. In 1988, the company bought the pulse combustion technology of Sume Corp. (Weser, Idaho) which had developed a pulse combustion dryer and installed one 11 years ago to dry brewer's yeast.

In the Bepex dryer, called Unison, combustion gases from the gas-fired pulse combustor and the material to be dried are fed separately into the dryer chamber. The hot gases pulsating at 150-200 Hz disperse the slurry into fine droplets, between 50 and 100 micrometers in diameter, then evaporate the water. Within 0.2 sec. the evaporating moisture reduces the gas temperature from 2000°F to between 200°F-250°F. The pulsating gases nip down the boundary layer around the droplets, effecting very high heat and mass transfer rates. Water constantly diffuses to the surface of each particle and evaporate, keeping the particles cool while the temperature drops rapidly. For heat sensitive applications, Unison is reported to be more efficient and less expensive than a spray dryer. Overall costs for fuel and electricity run up to 50% lower, because a spray dryer must be operated at a lower inlet temperature to avoid damaging product. Because it is more efficient, and therefore smaller, it costs from 35 to 50% less than a spray dryer.

So far Bepex has run tests on polymer emulsion, instant coffee, yeast and other food products without affecting their taste, aroma, physical or chemical properties. In future, the company plans to try dehydrating fruit juices. (*Chemical Weekly* 37(12), 1991, 101)

39 Control techniques helps crack cashew capacity constraint

An unusual combination of Control Techniques process and speed control equipment will help to almost double production of roasted salted cashews. In addition to increasing production rate, product quality has been enhanced to almost eliminate waste, resulting in an attractive project pay-back period of a few months.

Cashew kernels are inspected for unwanted debris and pieces of metal then fed into mobile containers. These bulk containers are taken to the frying room where they are positioned over the feed inlet of the fryer.

The fryer itself is a stainless steel bath containing hot oil that is continuously recirculated and filtered. Gas ribbon burners underneath the fryer provide the heat and a basket transport mechanism runs through it. Raw cashews are loaded into special baskets that are pulled through the fryer to cook the cashews. Optimum temperature in the fryer is 140°C and the residence time is around 8 minutes.

On exit from the oil bath, product is transferred to a salting and cooling plant prior to final packing.

In any continuous cooking process, the three variables which need to be controlled are the cooking time, process temperature and quantity of product being fed into the fryer. On this machine, the cooking time was controlled by a graduated knob, the temperature by an on/off thermostat and product feed rate (amount per basket) by the operator.

Other features of the 453 controller include an autotune facility which allows easy commissioning. The three term controller also ensures that the fryer is brought back online quickly and easily after shutdown.

Quality and consistency of the product has also been improved. In addition, the plant can be utilised to process other nuts, such as almonds and hazels, giving Playtime Foods much more flexibility. Reliability of the equipment has been excellent and no problems have been encountered after six months in operation.

For more information contact: Control Techniques Process Instruments at Stafford Park 6, Shropshire.

(Food Trade Review June 1991, 317-318)

40 Small scale vegetable dehydrator

Scientists in Bhopal have designed an electrically-operated dehydrator which can dry about 50 kilograms of vegetables daily in rural areas.

Being perishable by nature, vegetables start deteriorating soon after harvesting or picking. Sun-drying has been used since ancient times for better preservation, but the process is unhygienic and long.

The new dehydrator developed at the Central Institute of Agricultural Engineering (CIAE), Bhopal, basically consists of a drying chamber, a plenum chamber, a heating chamber and a blowing unit. The drying chamber has 20 trays made of nylon wire mesh for laying out the product to be dried.

The vegetables are 'prepared' by washing, peeling and cutting or slicing. The prepared material is blanched and the sulphited if required, and spread over the drying trays.

It is dried by switching on a blower and a heater for 11-14 hours.

Reporting the details of the dehydrator in the journal *Invention Intelligence*, CIAE scientist KK Singh said it was tested for processing cauliflower, cabbage and onion flakes.

The total cost of the production of the dehydrator is around Rs.12,000 and the cost of operation works out to a mere Rs.1.20 per kg of raw material.

The machine can be used for dehydrating surplus vegetables produced in rural areas, thereby reducing wastage and providing better income and employment opportunities to vegetable growers, Dr. Singh says.

(P.T.I. Science Service 10(19), 1991, 1)

41 Improved dal mill

Designed and developed for making dal from green gram, bengal gram and pigeon pea, it can also be used for dehusking rice. This mill can process 80 kg. dal in one hour. It works faster than ordinary dal mill. Two grinding wheels are made of rough emery stone, 2 ft. in diameter. Total height of the mill is about 3 ft. Two bearings are fitted at the bottom and one spout for feeding grains is placed at the top. As the grains come down between the two grinding stones, their skin is separated and are split into two parts.

The gap between the two wheels can be adjusted according to the size of the pea or gram and the dal should be checked repeatedly to see if the gap is of correct size or not. Care should be taken to see that no iron pieces or stones go in between the grinding stones. Improved dal mill is more useful than ordinary mill as separated husk is fed to the cattle, broken dal can be used at home and dal can be sold in the market. Weight of the mill is about 100 kg. and the price is about Rs.4000/-.

For more details contact: Udyog Mandir, Prayas, Mangarol, Rajpipala, Dist. Bharuch, Gujarat.

(Documentation Bulletin No.84, 1991, 12)

42 Potato pulper for small starch industry

An indigenous potato pulper that converts potato pulp into starch with nearly three-fourths efficiency is holding promise for rural-based potato starch industries.

The new potato pulper, developed by scientists at the Central Institute of Agricultural Engineering, Bhopal, is based on a Peruvian design. It gives potato starch with 73 per cent efficiency, with an output of 347 kg per hour at an optimum speed of 2600 rotations per minute.

Potato contains 12-20 per cent starch which is used in the food industry for preparing soups, sauces, breads, biscuits and crackers; in the textile industry for sizing cloth; and in the paper industry for improving the physical characteristics such as strength, stiffness, appearance and smoothness of paper.

The CIAE-developed pulper is made of stainless steel, with an overall size of 720 x 355 x 1080 cubic millimeters.

The machine's hopper is provided with a rasp plate which rotates to pulverise the potatoes with its 20 hacksaw teeth.

The Centrifugal force moves the water, starch particles and the pieces of skin into the interior of the pulper, where the starch particles and water pass through a mesh which separates the starch and lets the pieces of skin pass out through a waste spout.

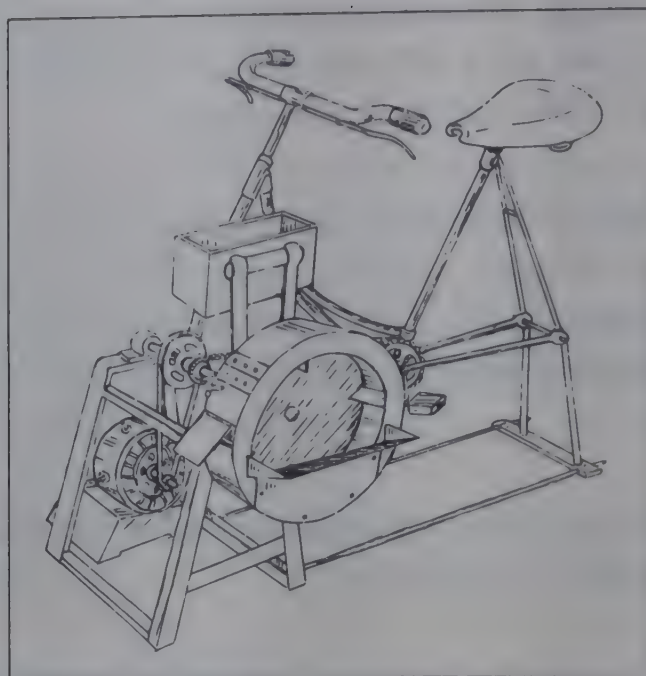
The total cost of the pulper is about Rs.5,500, with the cost of making the potato pulp estimated at Rs. 30 per tonne of feed.

(P.T.I. Science Service 10(19), 1991, 1-2)

43 Potato slicer

India's Society for the Development of Appropriate Technology (SOTEC) has established a demonstration centre for the purpose of developing appropriate processes for the storage and upgrading of locally grown crops. One example of their work is the potato slicing device.

The potato slicer (see fig.) consists of a cutting head with one adjustable blade; an impeller; an opening through which potatoes are fed; and a tank with water for lubrication. The machine can be driven by a cycle frame with pedals, as pictured, or by an electric motor. The throughput is 200-300 (or 300-600 if using the electric motor) kgs/hr of potatoes.



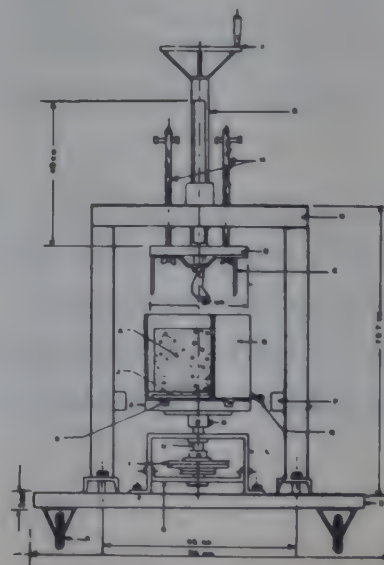
The cycle-driven potato slicer

For further information contact: Robert W.Nave, Project Director, Society for Development of Appropriate Technology (SOTEC), 182 Civil Lines (Jail Road), Post Box 75, Bareilly 243 001, Uttar Pradesh, India.
(*Appropriate Technology* 18(2), 1991, 23)

44 Palm-oil extraction machine 'Epomil'

The machine consists of two main parts. The upper stationary part has a screw spindle with a press plate which is provided with a 'mashing fork' in the first half of the operating cycle. The lower rotatable part has a 'mortar' on a turntable and is provided with a perforated metal basket during the second half of the cycle. The table is turned at a speed of 450 or 720 rpm by a 1 HP engine.

10 kg of boiled palm fruits are put in the mortar. The press plate with the mashing fork is lowered into position and the



Prototype of the 'Epomil' palm-oil extractor

mortar is rotated until the nuts are separated from the pulp. The pulp is transferred to the perforated basket and is pressed by turning the screw spindle by hand. The complete cycle takes 5-10 minutes depending on the skill of the operator.

The traditional methods of pounding the boiled fruits and squeezing out the oil by hand requires hard labour and gives a poor result in terms of quantity and quality. By contrast the 'Epomil' is a labour-saving invention which also improves the yield and is capable of handling all types and sizes of fruit. One prototype has been built and successfully demonstrated - local manufacturers have shown interest but no licence has been sold so far.

For further information contact: Professor Alex O.E. Animalu, Faculty of Physical Sciences, University of Nigeria, Nsukka, Nigera.
(*Appropriate Technology* 17(4), 1991, 23)

45 Multi-knife tea cutters

Increased yield, minimal dust and improved bulk density are benefits claimed for a range of multi-knife cutting machines when used for tea processing.

In contrast to conventional leaf crushers and hammer mills, the rotary cutting action of the Blackfriars machines allows prime grades and residue leaf to be processed with equal ease, whilst interchangeable screens allow the size of the final leaf to be carefully controlled. We are assured that fine dust and the characteristic liquor 'greying' are eliminated.

Two different models of tea cutter are currently available. Model 30/60 has a typical output of 750 kg per hour and a throat size of 100 by 610 mm, whilst for the larger 38/66 unit the figures are 1500 kg and 200 by 660 mm.

For details contact: Blackfriars Ltd of 5 Roman Way, Market Harborough, Leicestershire.
(*Food Trade Review* June 1991, 348)

46 Food sensor

A researcher in the Department of Food Science at Leeds University, northern England, works on the development of a food sensor which utilises ultrasonic sound waves.

The two most important applications for sensors in the food industry are in a laboratory to elucidate the fundamental properties and behaviour of food components and in a factory where they provide information about the properties of food, during processing. Sensors which can be used during the manufacturing process are particularly useful to industry as they eliminate the wasteful quality control procedure whereby samples taken from the production line are tested in the laboratory and, if an irregularity is detected, large batches of the product are discarded. In-line monitoring allows fluctuations in content to be detected and swiftly rectified, improving the end product and reducing manufacturing costs.

The project is a collaboration between Leeds University, the British Food Manufacturers Research Association and Unilever Research and is funded by Britain's Department of Trade and Industry. The first stage of the project has resulted in the production of an ultrasonic velocity meter (UMVI), which measures the ultrasonic velocity of a material, a reading which can be related to its physical properties, measuring for example sugar content of fruit drinks, oil content of salad creams and solid fat content of partially crystalline fats.

The second device, currently under development, can accurately measure the frequency dependence of the ultrasonic properties of liquid materials. It has a wide range of capabilities than the UMVI and can also be used to determine particle size and melting/crystallisation in emulsions.

(Financial Express 9 November 1991, 4)

47 Raisin separating machinery

Raisin making is a fast growing business, being developed as industry. At present, the entire processing is done manually which desperately needs modernisation. The time factor is the most important factor which accounts for sizeable part of the entire process and if this factor is ignored, the agriculturists are put to heavy losses. The destemming and separating of raisins are done manually, at present, which lead to adverse effect on time saving and maintaining quality.

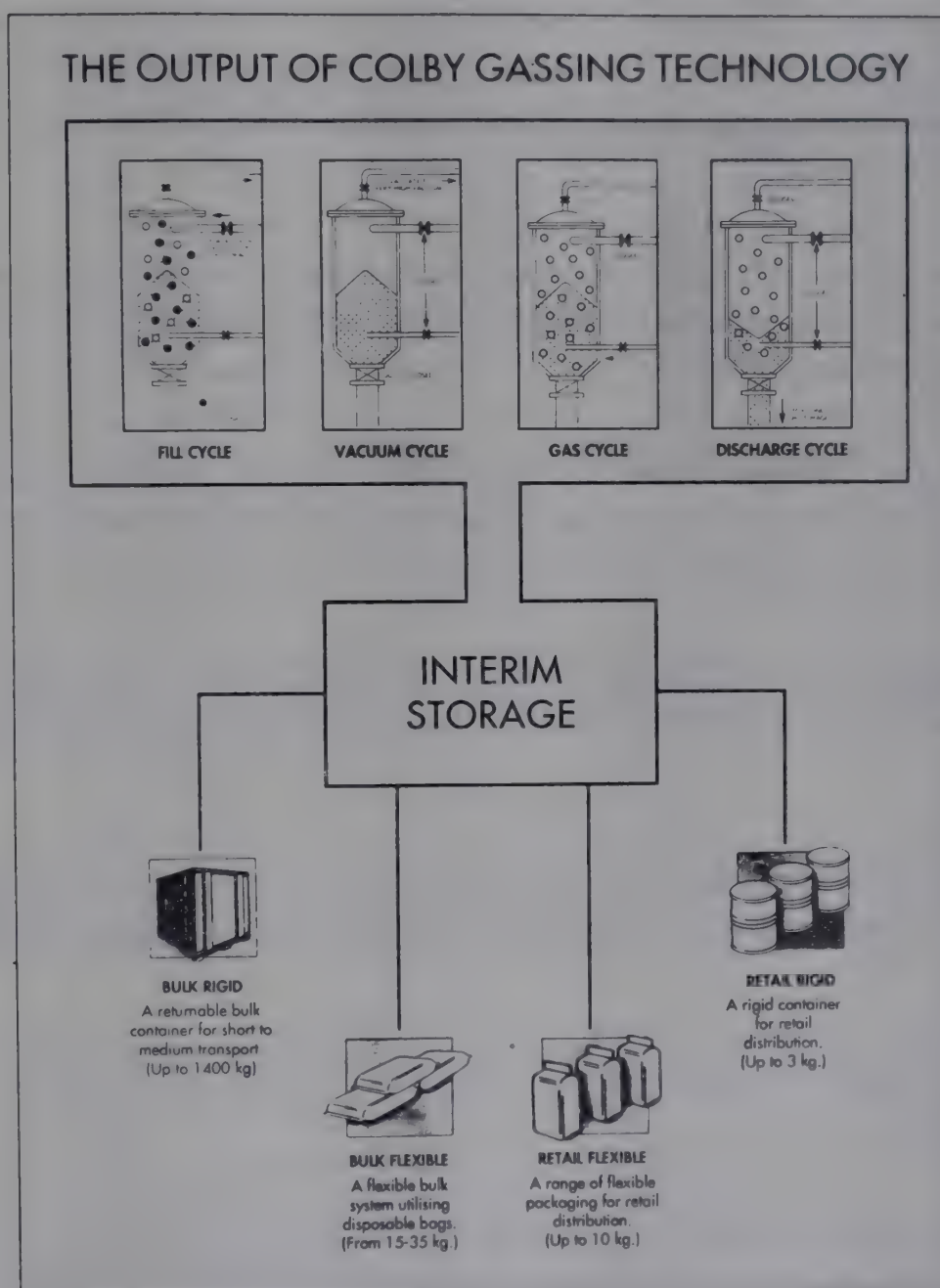
In raisin separating machine, all these short comings are overcome as the entire processing is done mechanically. This machine is very simple to operate. Raisins are put into machine hopper where it is elevated by the elevator and then dropped into the destemmer in a controlled manner. Here, the raisins are destemmed. Further, disintegrated stems and the foreign material, if any, are separated and the pure raisins are finally graded

according to the size. This machine has a capacity to separate raisins from 50 kg per hour to 500 kg per hour, with different models. the machinery requires three to 10 H.P. power supply.

For more details contact: Rahul Enterprises, 8, Rajebahadur Shopping Complex, Tilak Path, Nashik 422001.
(*The Economic Times* 21 October 1991, 2)

PACKAGING

48 Powder packaging technology



The Colbygas from Colby Packaging Systems is an innovative powder packaging technology that enables the shelf life of products such as milk

powder and baby formulas to be extended by up to 600 percent, providing enormous benefits right down the line, from the producers and packers to the end users of these types of products.

The process removes oxygen from bulk quantities of powders and granules and replaces it with inert gas prior to packing. The system also achieves higher through-put totally automatically, at a lower cost than any previous method, with the entire gassing cycle of a typical 250 kilogramme batch taking less than two minutes.

There are four steps in the Colbygas system:

- Fill cycle-the Colbytrans powder mover is used to transport the product from the previous process. Pressure is reduced to introduce the product into the Colbygas chamber, and nitrogen remaining from the previous cycle pre-flushes the product.

- Vacuum cycle - the chamber is evacuated to very high vacuum. Special chamber design and sophisticated controls ensure the removal of air normally trapped within the powder.

- Gas cycle - since there is virtually no air left in the chamber, the introduction of nitrogen gives residual oxygen levels of as low as 0.5 per cent using only one to two litres of free nitrogen per litre of product.

- Discharge cycle - gassed powder is discharged into the surge hopper which is sized to provide continuous feed to the filling process or to interim storage.

- A comprehensive range of equipment and systems to blend, fill, pack and transport a diverse range of powders and granules has also been developed by the company.

The standard Colbypac range caters for rigid and flexible packs in bulk and retail sizes.

The Vacuumaster is a compact, cost-effective method of post- gassing filled cans before they are seamed. A simple, reliable and economic machine, it uses a minimum of nitrogen to achieve residual levels of around 1 per cent.

The Colbytrans is developed as a totally new method of pneumatically conveying even the most fragile powders or granules with negligible product breakdown.

Other supporting equipment includes depalletisers, unscramblers, lowerators, can cleaners, checkweigher, cappers, labellers, channelisers, accumulators and packing machines.

Colby manufactures up to 80 percent of the entire packaging system.
(*Asia Pacific Food Industry* June 1991, 26-27)

49 Metallized film laminates for food packaging

A range of metallized film laminate from a British company is designed to extend the shelf life of perishable foods and beverages, particularly in hot and humid climates. These laminates are a cost effective alternative to aluminium foil structures. The greater flexibility offered by the foils can give rise to easier handling and higher productivity on packaging lines, and their bright metallic appearance and resistance to creasing can enhance pack appearance and maintain a fresh packed look on the shelf. The Campack range of high barrier metallised laminates from Camvac can extend shelf life of oxygen or moisture-sensitive dry food products, such as milk powder, coffee, potato products, snacks and baby foods, to a year or more, so eliminating the need for food preservation additives such as antioxidants which can affect food flavour. Laminates have also been developed for bag-in-box packaging of oxygen sensitive liquids such as wine, beverage syrups, fruit juices and purees. Bags can be produced in capacities ranging from 2 to 1,000 litres, for both retail and bulk packaging.

For more details write to: Camvac Ltd, Burrell Way, Thetford, Norfolk IP24 3QY, U.K.

(*Chemical Products Finder* 10(6), 1991, 116)

50 Polylactides - new biodegradable polymers from lactic acid

Biodegradable polymers called polylactides produced from lactic acid are close to commercialisation by Ecochem, a joint venture between Du Pont Chemicals and food company Con Agri. A pilot plant is scheduled for startup in 1991, with a world scale unit targeted for production by late 1994.

Polyactides are made from renewable resources such as cheese, whey and corn. They degrade into water and carbon dioxide in the presence of

moisture, air and common bacteria. The key to the development is the high efficiency of Ecochem's proprietary lactic acid technology and the high purity of the product.

The company is initially targeting uses in packaging products made of paper. The new polymer can be used as a coating or to formulate inks and adhesives. When the pack is recycled, the polylactide can be dissolved away, taking with it any printing ink, adhesives and toners etc. This enables the paper to be recycled into a higher quality use than currently available. Ecochem is especially interested in the potential uses in the fast food industry and in grocery products such as insulated drinking cups, fast food containers or frozen food packages.

The first commercial trials with the polymer are expected early next year. Trials of recyclability of packaging have so far proved very promising. The company expects to offer polylactides commercially to paper printing, packaging and speciality product companies by 1994.
(*Chemical Weekly* 37(8), 1991, 91)

51 Novel packaging material

Hamaapil (Israel) company MCP Performance Plastics has developed a packaging material which could revolutionise the food processing industry. With this new material termed C-PET/HB - ready-to-eat food products can be given a long shelflife without recourse to any of the conventional preservation technologies such as canning or freezing.

The transparent packaging material, made from crystallised polyethylene, hermetically seals and therefore protects the contents. The sealed package, and the contents, can then be sterilised immediately. A unique feature of this material is that the package can be heated in the oven, whether conventional or microwave, since it is stable over a very great range of temperatures

(*Business World* 18-31 December 1991, 32)

52 Recyclable plastics

A plastic that can be readily broken down into its component parts and reused has been invented by Robert Petcavich, a polymer scientist of Packaging Technology in the US. The material - Enviroplastic - is a mixture of polyethylene oxide and a compatible polymeric resin such as polypropylene,

polyethylene and polystyrene (or just about any thermoplastic material). The two components are mixed in a precise ratio, extruded under heat and pressure and then formed into products.

Polyethylene oxide is soluble only in cold water. The polymers are recovered by putting discarded material in cold water, dissolving the oxide and leaving the compatible polymer. The latter is filtered and then the polyethylene oxide is precipitated by boiling, which also destroys any bacteria present.

(Business World 9-22 October 1991, 12)

53 Biscuit wrapping machine

MOI Engg Ltd offers Brisk, a Biscuit Wrapping Machine. It is suitable for wrapping rectangular and square shaped biscuits into packets of 50 to 125 g at speeds up to 85 packs per minute with manual feeding, and up to 120 packs per minute with automatic counting and feeding system Briscount. The machine does a single or double wrap of wax coated paper, BOPP, and other heat sealable films for both inner and outer wraps in envelope style of side sealing and lap seal of the long seam. The machine has a tumble box design with spring loaded biscuit holders to handle wide variations in stack lengths up to ± 4 mm. An automatic print registration system is provided for printed films. Other features include: no product - no paper feed, digital temperature controllers, variable speed drive, machine speed indicator and an output counter along with quick size changeover.

For further information write to: MOI Engineering Ltd, A-7 Industrial Estate, SAS Nagar, Near Chandigarh, Punjab 160 051.

(Industrial Products Finder 20(2), 1991, 60)

ANALYSIS

54 Moisture tester

Moisture tester is a microprocessor based instrument for measuring the moisture contents of powders, flakes, granules and pellets instantly and non-destructively. These features reduce the effort required to take a large number of samples for a reliable representation of the product. Because of the non-destructive method of measurement, the sample can be mixed back with the bulk. As no sample preparation is required, the time required, for testing is very short.

A fixed weight of the sample is taken in the sample container (approx. 400 c.c. provided) and inserted into the test cell. Just pressing of a button gives the percentage moisture content which is displayed on the front panel. Moisture tester operates on the measurement of dielectric constant, which is a function of moisture content of the material.

The salient features are: Instantaneous measurement, non-destructive testing, no sample preparation, direct reading, self zeroing, 0.1% resolution, printer output, 99 types of products can be stored in its memory.

Typical fields of application are: pharmaceuticals, dehydrated foods, seeds, chemicals, snack foods, tobacco, tea, milk powder, yeast, biscuits, brewers, barley, meat, coffee, cocoa, crackers, paper and any other solid substance where moisture measurement is required.

(Chemical Weekly 37(13), 1991, 109)

55 Grain moisture meter

Naina Electronics manufactures NGM-303, a digital meter suitable for the measurement of grain moisture by a direct, quick and convenient method. Portable and simple to operate, the meter is manufactured from LSI CMOS devices and has an LCD display. NGM- 303 consumes low power and is portable and reliable. Its range of measurement is from 2 to 30% with a resolution of 0.1%. The reading displayed by the meter is referred to the scales/charts to find the moisture content of a particular grain.

For further information write to: Naina Electronics Pvt Ltd, Plot No.181/6, Industrial Area, Chandigarh 160 002.

(Industrial Products Finder 19(12), 1991, 25)

56 Food analyser

Tecator AB of Sweden has developed a dramatic, self-contained electronic food analyser which uses near infrared transmittance spectroscopy and requires little or no sample preparation. Called the Infratec 1225, it thoroughly analyses raw materials for the food-processing, dairy and livestock industries. It can also swiftly analyse protein, moisture, fat and fibres with the procedure taking less than a minute. Samples such as grains, pastes, meals, pellets among other things, can all be analysed with this instrument. Dustproof and waterproof, the product can be used in harsh shopfloor conditions for both process and batch quality control. It does not require a skilled operator.

(Business World 11-24 September 1991, 9)

57 Vitamin C determination in food products

A method developed by the CAMAG Laboratories (Switzerland) offers advantage in determining the amount of Vit C in a certain product. With CAMAC quantitative TLC there is easy sample preparation which is suitable for routine analysis with large sample throughput.

For further information contact: CAMAG, Sonnenmatistrasse IL CH41-32 Muttens, Switzerland.

(Chemical Weekly 37(9), 1991, 100)

58 New instrument to detect aflatoxin

The micro-oxymes O₂/CO₂ respirometer can detect growth of dangerous moulds which produce a carcinogenic poison known as 'aflatoxin' in grains, and bacterial contamination in food products. It can also spot changes in oxygen volume equal to 0.2 microlites an hour and consequently small levels of fungal contamination.

(The Hindu 30 October 1991, 24)

59 Test for trypsin inhibitor

Scientists at the USDA Agricultural Research Service (ARS) in Albany, California have developed new tests for trypsin inhibitors that impair the ability to digest proteins. The test developed use monoclonal antibodies to locate and bind to the trypsin inhibitors. The tests can distinguish between two types of inhibitors and can do so with greater sensitivity than present tests.

The tests will allow processors to more accurately determine the amount of active trypsin inhibitors remaining in the soy products after processing. The tests could also be used by plant breeders trying to develop soybean varieties with lower natural amounts of trypsin inhibitors.

Further information about the patented tests may be obtained from: USDA-ARS, Food Safety Research Unit, Western Regional Research Centre, 800 Buchanan St, Albany, California CA 94710.

(Chemical Weekly 37(12), 1991, 101-102)

60 New method to detect adulterants in beverages

A simple method to detect adulteration in toddy and other traditional beverages made from plant saps has been developed.

These include the fermented sap of plants such as coconut or sago used as intoxicating agent in some traditional drinks.

The most common fermented sap is toddy which contains two major adulterants - chloral hydrate and diazepam - which are known to have sedative effect.

Researchers at the Indian Institute of Chemical Technology (IICT), Hyderabad, have employed a method called "differential pulse polarography", an analytical technique that uses an electric current to detect the two adulterants in toddy.

The technique helps scientists measure both adulterants at the same time, unlike other current methods such as spectroscopy and chromatography which can detect only one at a time. The new method is simple, fast and accurate, according to IICT.

(Financial Express 17 October 1991, 4)

COMMERCIAL INTELLIGENCE

PRODUCTION (Raw Materials)

61 Rise in marine production

Fish production has risen from 2.8 million tonnes in 1984-85 to 3.836 million tonnes in 1990-91 even as the export of marine products has risen from Rs. 3840 million to Rs. 8900 million in 1991.

Delivering the inaugural address at the 16th Meeting of the Central Board of Fisheries, the Agriculture Minister, Dr. Balram Jakhar attributed the spectacular achievement to "the relentless efforts of fishermen/fish farmers" and planned programmes of the Government.

India is, currently, the seventh largest producer of fish in the world while being the second largest producer in the fresh water fisheries sector. According to the Agriculture Minister, the world fish production was a little

below 100 million tonnes in 1990 of which India's contribution was over 3.8 per cent. India's average annual growth in fish production was 6.25 per cent during the Seventh Five Year Plan as against the world average annual growth of 3.2 per cent during this period.

The Minister called upon the NCDC to have a relook in its financing to fishery cooperatives and provide liberal support to state and national level fishery federations to take up inter- district and inter-state fish marketing and creation of fish retailing infrastructure at important fish consuming centres.

Referring to aquaculture, the Minister said that it is expected that the present production of 0.8 million tonnes from aquaculture will be doubled by the end of Eighth Five Year Plan.

(Economic and Commercial News 21(40), 1991, 9-10)

PRODUCTION (Industrial)

62 Sugar output up 10.58 lakh tonnes

The sugar production in the country during the sugar year (October 1990 to September 1991) went up by 10.58 lakh tonnes to 120.46 lakh tonnes, according to a press release issued here on Friday by the Indian Sugar Mills Association (Isma).

The production of sugar in the last month of the just concluded sugar year witnessed a production of 68,000 tonnes against 42,000 tonnes of the same month of the previous year.

The total offtake of sugar during 1990-91 for internal consumption stood at 107.14 lakh tonnes including 80,000 tonnes of imported sugar as against 102.15 lakh tonnes of the previous year.

During the year under review, the exports of sugar has also gone up from 23,000 tonnes to 2.23 lakh tonnes.

The closing stock of indigenous sugar at the end of September 1991 stood at 33.30 lakh tonnes as against 22.21 lakh tonnes at the end of the previous year, the release added.

(The Economic Times 20 November 1991, 7)

63 Sugar status

Year	Area under sugarcane ('000 hectares)	No. of factories in operation	Total sugar produced ('000 tonnes)	Molasses production ('000 tonnes)
1987-88	3.279	356	9.110	4206
1988-89	3.329	366	8.752	3606
1989-90	3.405	377	10.988	4880

(*Indian Sugar* 40(11), 1991, 844)

64 Production of bakery products, confectionery and chocolate

Year	Bread	Biscuits	Confectionery	Chocolate
1987	125000	600815	27030	11023
1988	128000	616906	28000	7571
1989	-	591956	-	8411

tonnes

(*Chemical Weekly* 37(11), 1991, 119)

65 State-wise production of vanaspati in India

1988-89 in M.T.	
Uttar Pradesh	167630
Punjab	144558
Maharashtra	119382
Gujarat	110165
Delhi	09866
Madhya Pradesh	58337
West Bengal	57211
Rajasthan	53929
Haryana	38188
Andhra Pradesh	27158
Tamil Nadu	26196
Himachal Pradesh	16973
Jammu & Kashmir	12533
Assam	12129
Karnataka	11562
Bihaar	9790
Sikkim	7358
Orissa	6097

(*The Oils and Oilseeds Journal* 44(1-3), 1991, 81)

66 Self sufficiency in palm oil production

India could look up for selfsufficiency in palm oil production and save valuable foreign exchange if present expansion programme takes off in this field.

Last year, 2518 tonnes of crude palm oil was extracted from one of the only two such edible palm oil extracting units in the country. And the quantity of oil extracted from the raw material fresh fruit bunches (FFB) has proved economical.

The two existing units are located in Kerala and Andaman and Nicobar Islands.

The Kerala unit, run by the joint sector Oil Palm Industries Ltd. proposes to establish a modern processing factory with a capacity to process ten tonnes of FFB per hour.

This unit had collected 12,500 tonnes of raw material from oil palm estates at Yeroor and Chithare and extracted 2518 tonnes of crude palm oil last year.

With the economics of these extractions having been proved, official sources here feel that the Government would go ahead in sanctioning the expansion programme of the Kerala unit.

(Financial Express 25 December 1991, 10)

67 Expected yield per hectare (kg) in selected countries/regions to meet required demand for tea

Country/Region	Tea Area (000 ha)	Yield Per Hectare (Kg) in			
		1988	1993	1996	2001
India	420	1685	1879	2050	2388
China	1060	514	766	953	1383
Asia	2200	946	1090	1225	1492
World	2500	1001	1202	1350	1639

(Economic and Political Weekly 30 November 1991, M 147)

EXPORT

68 Export of red chillies

(Qty. in million tonnes)
(Value in '000 Rs.)

Year	Quantity	Value
1987-88	6,122	83,300
1988-89	7,926	1,87,200
1989-90	10,713	2,09,900

(*Business Star* September 1991, 5)

69 Black pepper exports - past and future

Indian black pepper has been a great attraction the world over ever since Vasco da Gama landed on the coast of Kerala in 1498 in pursuit of Oriental spices. For centuries its sway over the International market has remained unchallenged. Although the world trade in this commodity has undergone a seachange with the entry of new players, India has managed to maintain its position as a leading supplier of black pepper.

However, India's hegemony over the world market may not last longer judged by the disturbing exports trends witnessed over the past few years. Indian black pepper may lose its flavour before long, unless prompt steps are taken to stem the rot. Serious threat has arisen to black pepper export trade from the new entrants out to capture the world market. Already, the country has lost its grip over the world market in the case of cardamom. A similar fate awaits Indian black pepper if the country fails to overhaul its methods of cultivation. The devaluation and other trade reforms have not yet yielded desired results.

Brazil and other exporting countries have managed to make adjustments in their schemes of exports to dilute the benefits arising from the recent trade reforms in India. Brazil has, in particular, continued to initiate its offerings at substantially lower prices. Ofcourse, the availability of new crop from September last has come handy to this country in its game of undercutting India.

What is disturbing, however, is that India has not been able to adopt a controlling position even after new crop arrivals beginning November. The current brisk marketing of new black pepper crop and consequent substantial fall in the prices notwithstanding, India has not been able to withstand the growing competition from Brazil. This does not augur well for exports during the current year.

Considering the achievements by the competing black pepper producers in raising their production, it appears that India will have to face rough weather. The country has already lost a sizable ground from the level of 1960 when it enjoyed 48 per cent share in the world trade. Although its share is now higher than the low of 21 per cent touched in 1980, its position as the world leader is no more secure.

Even though the country accounts for one-third of world production, its capacity to influence the market trend is negligible.

The US, is of course, the major importer of black pepper but a bulk of its requirements is satisfied by Brazil, a nearby country offering the goods at fairly lower prices. Once it was the major buyer of Indian black pepper, its imports from India being as much as 15,091 tonnes in 1986-87. It brought down its imports from India to 2,161 tonnes in 1989-90 which are mere six per cent of its total imports from various countries. Its imports from India totalled 2,288 tonnes in 1990-91 (crop year) and are unlikely to improve during the current year in view of its sustained dependence on other sources of supplies.

The UK and Continental countries also seem to be diverting to cheaper sources of supplies. The imports by these countries have, therefore, dropped from 2,442 tonnes in 1989-90 to 1,452 tonne in 1990-91. France has diverted to Malaysia and to new entrants like Vietnam and Thailand. the unification of Germany has also affected the exports from India. East Germany which used to buy about 1,500 tonnes from India under bilateral trade agreement has stopped importing from India, while West Germany which requires nearly 3,000 tonnes, buys mostly from Brazil and Indonesia.

Further, the decision of the European Economic Community to form a unified market by 1992 will further erode the exports. Between them these countries buy as much as 38,000 tones out of which India's share is nearly 6,000 tonnes.

What is wrong with Indian black pepper ? Why are more and more countries switching over to other countries ? The answer is found in price consideration. Although aroma and pungency of Indian black pepper continue to be unparalleled, they alone cannot hold back the buyers. In fact, some of the beneficial qualities of Indian black pepper are neutralised by poor post-harvest practices. The presence of foreign matters like insects, filth, excreta, etc., in the supplies has compromised the quality of Indian spice. No wonder, the supply of sub-standard quality had led to the blacklisting of

Indian pepper in 1988 by the US. The ban on black imports from India has been lifted subsequently by the US but the prejudice against the Indian commodity persists.

Be that as it may, efforts have to be directed to reduce the prices since the increase in the production alone does not seem to be of much help. It is not dearth of supplies alone but high cost of production which hinder augmenting of exports.

Black pepper production during the current year is estimated at 70,000 tonnes of which India can spare upto 40,000 tonnes for exports, the domestic requirements being about 30,000 tonnes. However, exports of this order are doubtful in view of high level of prices in the domestic market. It is true that it is difficult to make out what is the remunerative price for the farmers but it goes without saying that the prices have to be brought down in the domestic market if the hegemony of Indian black pepper in the international market has to be retained. The outmoded methods of production and high demand pressure on domestic supplies have pushed up the prices making Indian pepper uncompetitive in the international market.

The best course to reduce the cost is to raise the productivity from the present low level of 300 kg per hectare. The yield in Malaysia is 1,575 kg, Brazil 1,200 kg and Indonesia 550 kg. The cost can be reduced substantially if India manages to raise the productivity to the Indonesian level of 550 kg. This is not difficult to achieve. Only the emphasis has to be on introducing improved methods of cultivation instead of bringing more areas under cultivation. For this the good planting material has to be multiplied rapidly and made available to farmers.

There are numerous research bodies engaged in the work of improving the productivity of the plants. What is the need of the hour is to extend the improved methods of cultivation to the farm level. If the country has to make its presence fully felt in the world market the present methods of cultivating black pepper in the backyards have to be abandoned and black pepper cultivation needs to be converted into plantation industry. Only such an approach can save Indian black pepper from the present onslaught of not only the old players like Brazil, Indonesia and Malaysia but also new entrants like Vietnam and Thailand.

(Economic Times 28 December 1991, 10)

70 Spices Board steps to boost exports

Popularisation of various brands, sending of delegations to selected markets, organising buyer seller meets, participating in selected international fairs and launching brand promotion schemes are some of the important measures launched by the Spices Board to promote export of spices.

The measures were taken following directives from the Union Commerce Ministry to take effective action to arrest decline in export of spices from 1,02,170 tonnes worth Rs. 275.76 crores in 1989-90 to 97,291 tonnes valued at Rs. 238.66 crores during 1990-91 according to the Ministry sources.

The decline in export of spices was due to variety of reasons - rise in domestic consumption, high prices in domestic market, making spices uncompetitive in international markets, lower exports in Gulf countries due to war and lower productivity of major spices during 1990-91.

India exported 59,784 tonnes of spices valued at Rs. 154.76 crore during the first seven months of the current financial year.

India's share in world trade had shown fluctuating trends 18.94 per cent in 1982, 20.24 per cent in 1983, 20.14 per cent in 1984, 16.43 per cent in 1985 and 17.77 per cent in 1986.

The board has taken initiatives to select five exporters and help them to popularise their brands in foreign markets by granting interest free loans, equivalent to 50 per cent of the total cost.

The repayment of the loan will commence from the fourth year onwards, in 10 half yearly instalments.

Besides, introducing a logo of the board and popularising the same in foreign markets to project Indianness and quality was also underway, sources said.

India is one of the leading spice producing countries in the world and produces important spices namely pepper, ginger, cardamom, chillies, turmeric and seed spices like coriander, cumin, fennel, fenugreek and celery.

The country registered a sharp decline in coriander production from 1.43 lakh tonnes in 1987-88 to 0.39 lakh tonnes in 1989-90.

The production of turmeric, ginger, chillies, and garlic, however, recorded an increase.

India is estimated to achieve 20.77 lakh tonnes production of spices during the current financial year.

The main countries where Indian spices are exported are East Europe, East Asia, the EEC and West Asia.

The sources said the major constraints in the way of spices exports were inadequate investment in cultivation, research and extension support, limited role of the Board and lack of clear export orientation in production programmes.

The production of pepper in India per hectare is 290 kg as against 2,925 kg in Malaysia and 1,580 kg in Brazil, cardamom 63 kg as against 200 kg in Guatemala, Turmeric 276 kg against 515 kg in Morocco and chillies 802 kg as against 1,073 kg in Sri Lanka and 1430 kg in Pakistan.

The demand for pepper in world markets is, the former USSR (39 per cent), West Asia (45 per cent), the UK (31 per cent), for curry powder in the former USSR (39 per cent) and for chillies and turmeric in the UAE (41 per cent and 45 per cent respectively), the sources said.

(Financial Express 4 February 1992, 12)

71 Cardamom exports up nearly 200 p.c.

Small cardamom in 1990-91 brought in Rs. 102.2 million in foreign exchange, which is about 192.8 per cent more than the previous export figures.

According to the report of the Commerce Ministry, India exported 379 tonnes of small cardamom in 1990-91, registering an increase of 121.6 per cent over the previous year. Similarly, India exported 787 tonnes of large cardamom in 1990-91 valued at Rs. 43.2 million.

Small cardamom is produced mainly in Kerala, Karnataka, Tamil Nadu in an estimated area of 105,000 hectares. In 1990-91, the quantity produced was 4050 tonnes as compared with 3100 tonnes in the previous year. Large cardamom is grown in Sikkim, West Bengal over an area of 23730 hectares. The production was 4500 tonnes in 1990-91.

Efforts are underway to increase productivity and reduce costs in order to meet competition in the international market. The Spices Board had arranged supply of quality planting material to the small marginal farmers through departments and certified nurseries.

During the last financial year, 3.991 million cardamom seedlings were supplied to the farmers at a cost of Rs.2.27 million.

Cardamom replanting scheme aims at providing subsidy for replantation of old, diseased and uneconomic cardamom plantation belonging to farmers in the small growth sector. About 700 hectares were used for the purpose in 1990-91 costing Rs. 9,26,000.

Special incentives were offered to tribal growers for increasing production and quality. About Rs.4,00,000 was provided for the purpose in the 1990-91 Budget.

The Spices Board is implementing a programme for developing water sources in cardamom plantation, owned by small and marginal cardamom farmers, under the Western Ghats Development Programme jointly with the Karnataka Government. The subsidy is granted to planters for constructing water storage devices and installation of irrigation equipment. A similar scheme, which was taken up in Kerala jointly by the Kerala Government and Udumbanchola district for the benefit of farmers belonging to all sectors, has been completed.

The Indian cardamom research institute's main aim is to develop suitable protection and technology transfer for small and large cardamom and to increase production of these crops.

The research aspects covered by the institute are varietal improvement of agro techniques and nutrition, pest and disease management, post harvest management and transfer of technologies. Agronomy and soil science, plant pathology and entomology divisions have well established laboratories. (*Economic and Commercial News* 21(36), 1991, 6-7)

72 Fall in Cashew exports

The lower production of indigenous crop and lower imports of raw cashewnuts have adversely affected export of cashew kernels during the current year.

In the first half of 1991, cashew exports totalled 19012 tonnes, a fall of nine per cent from the figure for the same period the previous year.

However it brought in higher earnings of Rs. 198.37 crores registering a growth of five per cent, thanks to the appreciation in unit export price.

Unit export price in the review period averaged Rs. 104.34 per kg. as against Rs. 82.35 in the previous year.

In June 1991, exports amounted to only 4,083 tonnes as against 6,005 tonnes in June 1990, a fall of 30 per cent. The earnings realised also declined by 2.7 per cent to Rs. 49.08 crores. Of this, 1,363 tonnes went to the US, 936 tonnes to the Netherlands, 524 tonnes to Japan, 469 tonnes to USSR, 188 tonnes to Australia and 185 tonnes to the UK, according to the Cashew Export Promotion Council.

In June, unit export price for wholes and brokens moved up further. Export price for wholes went up by 1.59 per cent to Rs. 117.79 per kg from Rs. 115.94 in May 1991, while brokens registered a sharp increase of 26.29 per cent to Rs. 112.36 per kg from Rs. 88.97 respectively.

In June, the unit export price for both wholes and brokens moved up further.

The export price for wholes increased by 1.59 per cent to Rs. 117.79 per kg from Rs. 115.94 in May 1991, while the brokens registered a sharp increase of 26.29 per cent to Rs. 112.36 from Rs. 88.97 per kg respectively.

The comparative prices for wholes and brokens in June 1990 were Rs. 85.60 per kg. and Rs. 60.04 less by 38 per cent and 87 per cent respectively from June 1991 level.

During the first half of 1991, exports of cashewnut shell liquid witnessed a growth of about 42-43 per cent both in quantity and value. The export figures in the review period were 2,447 tonnes valued Rs. 1.85 crores, the council said.

Exports in June 1991 were 462 tonnes valued at Rs. 34.05 lakhs compared to 514 tonnes valued at Rs. 33.98 lakhs in the same period the previous year.

Unit export price in June 1991 averaged Rs. 7,370 per tonne. 11 per cent less than the May price of Rs. 8,235. The comparative price in June 1990 was Rs. 6,611 a tonne. Average export price from January-June 1991 was Rs. 7,655 a tonne as compared to Rs. 7,616 in 1990, a decline of 0.66 per cent.

There was no import of raw cashewnuts through Kochi and Mangalore ports in June 1991. Cumulative total imports from January to June 1991 were 8,443 tonnes compared to 46,654 tonnes in the same period in 1990. (This excludes imports through Tuticorin and Madras ports during April to June 1991).

The average import price in the review period was Rs. 17.77 per kg as against Rs. 14.24 per kg in the same period the previous year, a hike of 24.79 per cent, the council said.

(Financial Express 26 October 1991, 12)

73 19 p.c. rise in export of cashew kernels

Exports of cashew kernels have increased from 47941 metric tonnes valued at Rs. 3639.2 million during 1989-90 to 53294 metric tonnes valued at Rs. 4348.1 million during 1990-91.

As per projections made in the Ministry of Commerce, exports of cashew would be at a record level in the current year earning foreign exchange of the order of Rs. 5500 million. Bulk of the exports of cashew in the current year would be to the hard currency areas.

Mr. Salman Khursheed, Deputy Minister of Commerce, held a meeting recently to discuss ways to increase production of raw cashewnuts and thereby generate larger exportable surpluses. The meeting was attended by the representatives of the Ministry of Agriculture, Indian Council of Agricultural Research, Government of Kerala, Chairman, Cashew Export Promotion Council and senior officials of the Ministry of Commerce. The meeting considered various alternatives available for enhancing production, research, marketing and export and there was, therefore, need for concerted and coordinated action so as to achieve the best results.

Meanwhile, the Reserve Bank of India (RBI) has announced that the requirement for cash margin for import of raw cashew nuts has been waived. This is subject to the condition that the importer-exporter of the nuts will export to a value which is a minimum 133 per cent of the CIF value of the

imported raw cashewnuts within 90 days of import for which a bond would be given to the Ministry of Commerce and there is no export outstanding beyond six months from the date of export.

The Commerce Ministry has taken up the suggestion with RBI that the 200 per cent cash margin in the case of imports of raw cashew nuts be waived since this is an important thrust sector generating foreign exchange to the tune of Rs. 4500 million to 5000 million annually as well as providing employment to about 150,000 workers, mostly women, from the weaker sections of society.

Further, following the Ministry's intervention, RBI has also agreed to a proposal of the Kerala State Cashew Development Corporation for margin-free import of raw cashewnuts provided the export is under 90 days' suppliers' credit and the corporation undertakes to realise export proceeds within 90 days and there is no export bill outstanding beyond six months from the date of export.

(*Economic and Commercial News* 21(40), 1991, 6)

74 Exports of oilcakes to the EEC from India

		Q: : Tonnes; V: 000 ECU				
		1985	1986	1987	1988**	1989
FRG	Q	27,689	6,483	5,770	1,818	11,139
	V	3,435	440	351	214	2,009
France	Q	4,243	11,846	8,850	5,141	44,658
	V	460	1,769	728	448	7,698
Italy	Q	104	7,942	3,282	6,401	123,888
	V	7	998	315	715	19,575
Netherlands	Q	77,803	149,084	19,564	9,709	81,046
	V	8,277	13,063	1,946	1,010	8,971
Bleu	Q	28,221	8,530	3,765	13,042	24,226
	V	2,707	709	335	1,243	2,749
U.K.	Q	285,553	206,736	282,734	386,521	406,754
	V	29,268	22,002	27,943	27,932	42,192
Ireland	Q	5,829	8,882	7,968	12,675	16,014
	V	765	832	686	1,048	1,531
Denmark	Q	46,038	21,140	8,641	21,026	77,946
	V	11,578	4,121	1,463	4,652	20,542
Spain	Q	-	-	-	19,684	132,203
	V	-	-	-	5,054	28,270
Portugal	Q	-	-	13,653	4,222	19,836
	V	-	-	1,200	874	2,744
Total	Q	475,480	420,643	354,027	380,239	937,710
	V	56,497	43,935	34,966	43,190	136,281

**1988 : Excl. Greece

(*The Oils and Oilseeds Journal* 43(10), 1991, 31)

75 Substantial drop in groundnut extractions export

Export of groundnut extractions has dropped substantially during 1990-91 stood at 1.40 lakh tonnes valued at Rs. 34.75 crores as against 4.20 lakh tonnes worth Rs. 83.71 crores in the previous year.

The substantial decline in the export was mainly due to failure of groundnut crop in Gujarat, according to Mr. S.B.Jhaveri, Chairman, Groundnut Extractions Export Development Association (GEEDA). Since exports move almost exclusively from Gujarat, which accounts for 90 to 98 per cent, exports of groundnut extraction depends directly on the state's production, he pointed out. The groundnut production in 1990-91 from Gujarat was about one million tonnes (in shell) as against 1.8 million tonnes in the previous year.

However, exports during the current year are expected to be good. Export sales as reflected from registration of contracts with GEEDA will be to the tune of Rs. 100 crores, Mr. Jhaveri indicated.

Addressing the 22nd annual general meeting of the association, Mr. Jhaveri said that the rupee trade system no longer existed except in Czechoslovakia and to a small extent in Romania.

(Financial Express 29 September 1991, 2)

76 Spurt in marine products export

Exports of marine products have increased by 40 per cent to Rs. 890 crore during 1990-91, despite the uncertainties caused by the Gulf crisis. The Government is taking up more steps to raise production by culture fisheries with a view to boost marine products exports. The idea is to raise per hectare yield from shrimp farms. The Government has proposed to bring more areas under export production of shrimps, induct new technologies apart from encouraging value addition, modernisation of processing facilities, quality upgradation, waste reduction and aggressive marketing promotion measures. The Government has already announced a deep-sea fishing policy to encourage this sector. The policy is aimed at providing a single-window clearance for proposals received from entrepreneurs. The total world demand for fish is expected to rise to 110 million tonnes by 2000 A.D.

(Industrial Products Finder 20(2), 1991, 109-111)

77 Marine exports from India

India's earnings from the export of marine products during the first five months of the current financial year aggregated Rs. 4470 million. The Government has, incidentally, fixed an export target of Rs. 15,000 million for the sector for the year 1991-92, thus, envisaging a growth of over 60 per cent in rupee terms and 10 per cent in dollar terms.

During 1990-91, the country exported a record 139,419 tonnes of marine products, worth Rs. 8930 million, thereby achieving a growth of 25.78 per cent in volume and 40.69 per cent in value as compared to the previous years' exports.

There has been a continuous rise in the export earnings' growth of marine products from Rs. 54.66 per kg in 1987-88 to Rs. 64.51 per kg in 1990-91. Incidentally the total production in the fisheries sector in 1989 was of the order of 2.22 million metric tonnes of which 60 per cent came from the marine sector and the remainder from the inland fisheries sector.

As it happens, Kerala and Maharashtra are the major producers, accounting for 50 per cent of the total marine landings. Other important producers are Gujarat, Tamil Nadu and Andhra Pradesh.

The country has a 7515 km-long coast line with a Continental Shelf area of 4.5 million sq. km and 2.02 million sq. km of Exclusive Economic Zone (EEZ). The estimated potential of the Indian EEZ is to the tune of 4.47 million metric tonnes. The production potential of the inland marine areas, when fully exploited, has been estimated to be in the region of 4.5 million tonnes.

(Economic and Commercial News 21(43), 1991, 8)

78 Tea export earnings up

Despite decrease in the export of tea, the total earnings and the unit value realisation on the Indian tea has substantially gone up over the past five years. According to an official release issued here on Thursday, the exports of tea has come down during 1990-91 to 199.48 million kg as against 210.62 million kg of the previous year.

But the earnings was placed higher at Rs. 1045.41 crore as against Rs. 904.72 crore of the previous year. The unit value realisation was also higher

at Rs. 52.40 per kg as against Rs. 42.86 per kg of the previous year. The rising domestic demand is the major reason for the stagnation in the quantitative rise in the exports of tea.

(*The Economic Times* 2 December 1991, 16)

79 Exports of Tea

Year	Volume (Re.Crores)	Value (Rs./Kg.)	(million kg) Unit Value (Rs./Kg.)
1960	193.0	120.0	6.2
1970	196.5	140.0	7.1
1980	224.0	229.0	10.2
1981	241.0	434.0	18.0
1982	190.0	355.6	18.7
1983	208.5	516.8	24.8
1984	216.9	740.5	34.1
1985	214.0	695.0	32.5
1986	203.0	590.0	29.1
1987	209.2	638.8	30.5
1988	221.5	645.0	29.3
1989	223.0	800.0	35.9

(*Productivity* 32(1), 1991, 123)

80 Exports of major agricultural commodities

(Qty. in '000 MT value in Rs. crores).

Commodities	1987-88		1988-89		1989-90	
	Qty.	Value	Qty.	Value	Qty.	Value
Tea and mate	197.3	592.4	193.4	598.9	209.3	904.5
Coffee	88.7	263.2	82.0	279.7	115.1	342.6
Rice	371.6	324.5	375.6	331.4	421.7	426.5
Wheat	246.0	35.4	15.8	2.9	11.8	2.1
Tobacco unmanufactured	60.7	109.3	45.1	102.8	57.4	143.3
Tobacco manufactured	15.7	25.2	11.0	25.5	13.3	31.7
Spices	83.1	309.2	93.8	250.6	96.7	246.5
Cashew Kernels incl. CNSL	36.1	306.7	37.7	277.2	47.9	367.6
Meat and meat preparations	-	85.5	-	94.4	-	113.7
Marine products	97.9	525.1	158.5	632.5	124.6	686.5
Fruits and vegetables	-	150.7	-	163.8	-	208.0
Oil cakes (meal)	684.2	173.2	1242.6	370.4	2204.4	546.1
Cotton raw	73.0	95.4	13.5	28.0	53.1	128.3
Misc. Processed foods	-	65.9	-	121.1	-	160.0
Other commodities (est).	-	250.0	-	300.0	-	350.0
Total agricultural commodities	-	3312.2	-	3579.8	-	4529.3
Total Exports of all products	-	15741.2	-	20295.1	-	27681.4
Share of agricultural commodities	-	21.0	-	17.6	-	16.4

(*Chemical Weekly* 37(11), 1991, 121)

81 Fruits, vegetables exports decline

Export of fruits and vegetables products sharply declined from 63,967 tonnes in 1989 to 48,900 tonnes in 1990.

In value terms they were worth Rs. 73.67 crores in 1990 compared to Rs. 79.48 crores in the previous year, according to the annual report of the Ministry of Food Processing for 1990-91.

The report attributes the decline in quantity of exports to the failure of the mango crop and consequent high prices of mangoes.

There has been a steady increase in the total installed capacity of fruit and vegetable processing industry, which was estimated at 8.94 lakh tonnes at the end of December 1990 as against to 7.08 lakh tonnes in December 1989.

Major processed items are fruit juices and pulps, ready-to-serve beverages (fruit based drinks), canned fruits and vegetables, jams and jellies, marmalades, pickles and chutneys, preserved and candied fruits and vegetables, sherbats, dehydrated vegetables and tomato products.

More recent products are frozen vegetables, frozen pulps, freeze dried vegetables, fruit juice concentrates, fruit bars and tomato paste.

Licensed units under fruit products order, 1955 (FPO), which lays down product specifications and other requirements for quality control on production and marketing of fruit and vegetable products and is administered by the Ministry, also increased during this period from 3,629 to 3,846.

In 1989-90, there was a marginal increase in production of ready-to-eat extruded foods, which include pasta products like noodles, macaroni and vermicilli, corn-flakes, oat flakes and pearl barley, compared to 1988-89.

Production of ready-to-eat extruded foods was 14,700 tonnes in 1989-90 compared to 14,000 tonnes in 1988-89. However, in 1990-91, the production is likely to fall to 13,200 tonnes.

Production of cocoa products like chocolates, drinking chocolate, cocoa butter substitute and cocoa based malted milk foods increased to 40,000 tonnes in 1989-90 from 35,900 tonnes in 1988-89.

In 1990-91, cocoa products output is estimated to fall to 39,383 tonnes. Production of high protein foods is estimated to go up in 1990-91 to 9,356 tonnes from 8,900 tonnes in 1989-90.

Currently about 30 per cent of the country's milk production is converted into milk products of which ghee alone accounts for 85 per cent.

The production of milk powder and infant milk has increased from 22,000 tonnes in 1970 to 1,65,000 tonnes in 1989 and marginally decreased to 1,55,000 in 1990. Cheese production during 1990-91 was 2,000 tonnes. During this period two letters of intent were issued for the manufacture of yoghurt, malted foods, cheese and butter.

The number of modern rice mills has gone up from practically nil in 1970 to 29,614 in 1990.

The current production of meat and meat products is 1.22 million tonnes. Sheep and goats contribute 54 per cent of meat and meat products, 26 per cent is contributed by cattle and buffalo and the rest is contributed, by pig, poultry and others. Out of the total meat exports, buffalo meat, which is restrictively consumed in the country, alone constitutes 72 per cent. Buffalo meat is being developed as an export-oriented commodity. Buffalo meat valued at more than Rs. 90 crore was exported last year.

(Financial Express 1 October 1991, 9)

IMPORT

82 Edible oil to be imported

The government has decided to import 1.50 lakh tonnes of edible oil to improve availability and meet the increasing demand from the states.

Out of this, 70,000 tonnes would be imported by the Centre and the rest by state governments.

This was disclosed at the first meeting of the consultative committee attached to the ministry of civil supplies and public distribution system held here on Monday.

(The Economic Times 20 November 1991, 1)

83 Cash margin for raw cashewnuts import waived

The requirement of cash margin for import of raw cashewnuts has been waived by the Reserve Bank of India.

This is subject to the condition that the importer - exporter of the nuts will export for a value which is a minimum 133 per cent of the CIF value of the imported raw cashewnuts within 90 days of import, for which a bond will be given to the Ministry of Commerce, and there is no export outstanding beyond six months from the date of export.

According to an official press release here, the matter had been taken up with RBI by the Commerce Ministry. The Ministry suggested the 200 per cent cash margin in the case of imports of raw cashewnuts be waived as this was an important thrust sector generating foreign exchange to the tune of Rs. 450 crores to Rs. 500 crores annually and providing employment to about 1.5 lakh workers, mostly women from the weaker sections of society.

Further, following the Ministry's intervention, RBI had also agreed to a proposal of the Kerala State Cashew Development Corporation for margin-free import of raw cashewnuts provided the export was under 90 days 'suppliers' credit and the corporation undertook to realise export proceeds within 90 days and there was no export bill outstanding.

(Financial Express 30 September 1991, 1)

84 Imports of almonds allowed

The Government has again allowed imports of almonds. Besides, amendments in the import policy for cloves and cinnamon/cassia have also been made.

A public notice issued by the Chief Controller of Imports and Exports (CCIE) stated that the government has decided to grant licences for the import of almonds on a review of the position. It is, however, subject to certain conditions.

The government had withdrawn on March 28, 1991, the provision for the grant of licences for the import of dry fruits and almonds as also the facility for import of almonds against additional licences.

In terms of the latest notification, all those who obtained licences for import of almonds in 1990-91 will be eligible for import licences in 1991-92 subject to fulfillment of export performance in respect of licences obtained in 1990-91 for import of almonds.

Each eligible applicant will be granted special licence equal to the value of his export performance subject to a maximum of rupee equivalent of dollar 1,300.

Applications for the grant of special licences for import of almonds are to be made to the concerned regional licensing authority in the form given in appendix XIII-A of the Hand Book of Procedures.

Another public notice issued on September 19 said that the government has decided to grant licences, on a review of the position, for the import of cloves and cinnamon/ cassia during the licensing year 1991-92, to the past importers to the extent of 10 per cent of their best year's imports in any of the licensing years from 1983-84 to the preceding licensing year.

The calculation of the entitlement and minimum value of the licence will be in terms of the public notice issued on October 30, 1990.

Licences would be granted subject to the condition that from the licensing year 1992-93 the applicants will be required to furnish evidence of exports of Indian spices during the preceding licensing year for a value to the extent of 150 per cent of the value of the import licence given during the preceding licensing year.

(The Economic Times 25 September 1991, 10)

85 Import of dry fruit against exim scrip

The import of dry fruits (other than almonds and cashew units) has now been allowed against the Exim scrip.

Under the original import and export policy for 1990-93, import of these dry fruits was permissible against licences granted to dealers in dry fruit trade on the basis of 25 per cent of the best year's import subject to a minimum of Rs. 20,000.

This provision was deleted on March 28 this year for a review of the import policy.

(Financial Express 13 October 1991, 14)

86 'Actual User' condition for raw materials import removed

In an extraordinary move, the Commerce Minister, Mr. P. Chidambaram recently announced the dispensing of "actual user" condition in regard to import of raw materials, components, consumables, spares, and also capital goods. This would permit manufacturers and traders to import roughly 3,770 items freely.

Also, the Commerce Ministry has removed the condition of having registration or industrial approval from the concerned authority for import of OGL capital goods, raw materials, components, consumables and spares.

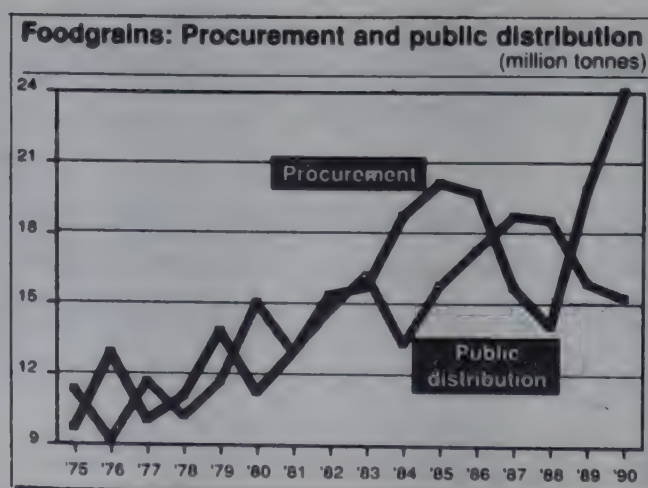
To help the phased manufacturing programme (PMP) units, which as a concept was abolished in the new industrial policy, the government has now allowed them to import essential items through Open General Licence (OGL) list instead of limited permissible list as of now.

Announcing these two bold steps, the Commerce Minister, Mr. P. Chidambaram said that the PMP units which were at a disadvantage, can now freely import the raw materials through OGL route. Hitherto the 'actual user' condition permitted only manufacturers to import items of certain items and components depending upon their license, marketed goods and utilisation certificate.

(*Chemical Weekly* 37(10), 1991, 83)

TRADE INFORMATION

87 Foodgrains: Procurement and public distribution



For the last two years, procurement of foodgrains was considerably higher than the public distribution of foodgrains, thus reversing the position that obtained in 1987 and 1988. According to official data, food procurement scaled a new peak at 24 million tonnes in 1990 marking an improvement of over nearly four million tonnes as compared to 1989. In contrast, the offtake from the public distribution system (PDS) was virtually unchanged in both these years at around 15.5 million tonnes. Over the past 15 years, we have come a long way in the matter of volume of procurement but the quantity distributed under PDS has shown some degree of fluctuations in many of the years. One of the main planks of our agriculture has been to undertake large-scale procurement and public distribution as a measure of providing food security to the people

(Economic Times 28 December 1991, 10)

88 Food processing industry lacks modern technology

The Indian food processing industry has failed to make the grade for lack of proper infrastructure for inventing specialised machinery.

Official sources said that none of the manufacturers were engaged in development of new lines of plant and machinery for the industry and the situation was so bad that most of the manufacturers did not even have the necessary design and development infrastructure for the purpose.

The Government has identified that there was a lack of design know-how for equipment of at least seven types.

- High-speed specialised centrifugal separators.
- Large capacity spray drying and roller drying.
- High technology evaporation and aroma recovery.
- Specialised heat exchangers for ultra high temperatures.
- Special types of forming and cooking machinery.
- Aseptic processing and packaging.
- Super critical fluid extraction equipment.

Having identified the "major constraint" behind the "not so good" performance of the food processing industry, the Government has finalised a scheme for setting up a chain of "food engineering" centres for research and development of proper equipment for the purpose during the Eighth Plan period.

The scheme had already been submitted to the Planning Commission for its approval and allocation of necessary funds for the purpose.

Giving details of the scheme, the sources said the centres would promote new indigenous products, processes and machinery.

A centre would offer services against charges and could earn up to 50 per cent of its recurring expenses annually over a period of time, the sources said.

A food engineering centre would have five sections as major infrastructural components: A pilot plant complex incorporating scale-down versions of plants and machinery for selected processes and basic unit operation equipment. The complex will have an amount of in-built flexibility such that specialised small production lines could be assembled to meet the periodical requirement.

- A food engineering laboratory equipped with laboratory testing instruments needed for data generation on engineering properties of raw materials and other ingredients.

- A design centre, with facilities for evolving new designs for plant and machinery and to provide engineering assistance to industries during project implementation.

- A prototype machinery fabrication shop for building up prototype machinery and installation of plants. The centre can also undertake contracts for fabrication and supply of machinery required by them.

- A food instrumentation laboratory, with facilities for evolving precision process control systems both for plants evolved in the centre and existing industrial plants.

The sources said a feasibility study for the establishment of the food engineering centres had already been conducted.

(Financial Express 11 February 1992, 1)

89 Total world trade in spices and India's share

Spices	Avg. World Trade (MT)	Avg India's Export (MT)	India's Export as % of world Trade
Pepper	1,30,000	38,000	29%
Cardamom (small)	10,000	2,800	28%
Capsicum	60,000	4,700	8%
Ginger (dry)	16,000	7,000	44%
Turmeric	20,000	10,600	53%
Seed Spices	60,000	16,000	27%
Curry Powder	6,000	2,800	47%
Other Spices	60,000	5,400	9%

(Export Inspection Journal 8(1), 1991, 4)

90 Non-conventional oil recovery

The lower recovery of non-conventional oils is mainly due to inadequate fiscal incentives to exploit resources as only about 11 lakh tonnes of a potential of 23 lakh tonnes of vegetable oils from non-conventional sources is harnessed, according to the Solvent Extractors' Association of India.

The projections for extractions for 1991-92 are 34,00,000 tonnes with the export earning of Rs. 965 crores from the current year production of 26,34,000 tonnes and an export earning of Rs. 654 crores, the release adds. The association has urged the Government to remove the excise rebate limit to increase consumption of solvent extracted oils and rice bran oil in vanaspati.

The collection of salseeds which provides employment to tribals should be given money credit benefit. If the limit on rice bran oil is raised the quality of the oil can be increased while additional production of non-edible bran oil will reduce imports of palm fatty acids and other acid oils imported by the soap industry.

Further, the Ministry should examine SEO licence issue so as to make available concessional duty to persons interested in installing the solvent extraction plant. The notification for full exemption from excise duty for all vegetable oils under subheading No.1503.10 of the schedule although made clear, any condition for availing the benefit has not been prescribed, the press note said.

Direct incentives like the disclaimer in favour of supporting manufacturers with regard to Section 80 HHC of the Income Tax Act 1961,

profit on sale of Exim Scrip etc. and indirect costs of trading goods which are not definitely stated to have also been listed for consideration of the Ministry by the association.

(Financial Express 20 December 1991, 3)

91 High duty structure hampers food processing industry

The existing high duty structure on packaging materials has been a deteriorating factor in the development of food processing industry in India.

According to experts from the industry, tax components in retail prices of a processed food packet varied from 30 to 70 per cent mainly because of high excise duty of 16.5 per cent, custom duty of 80 per cent and sales tax of 4 to 12 per cent on various packaging materials like sanitary cans, labelling, cartoning and strapping.

These taxes virtually nullified the benefits of the government action to abolish the excise levy on the processed food product last year identifying the industry as a thrust area for exports, they said.

Industry sources said the excise benefit was only on the food produce and did not extend to the packaging material such as bottles and tinplate-made cans used by the industry. About 65 per cent of the cost of packaged and tinned foods is accounted for by the packaging material and a three kgs empty tin which cost Rs. 17.82 in 1990, is now costing Rs. 28.83.

The high price line was further exaggerated by non-availability of tinplate which is a channelising item imported by Minerals and Metals Trading Corporation (MMTC).

While a total packaging cost element of 30 per cent is considered to be the average norm in the developed countries, it compared unfavourably to customers in India, they said.

In fruit production, India ranks third after Brazil and the USA and has over two million square kms of exclusive economic zone capable of producing 4.5 million tonnes of fish and other marine products annually. But only 30 per cent of marine resources are being exploited in India as against 60 to 70 per cent in Brazil and the USA.

The output of Indian food processing industry in value terms is Rs. 24,000 crore per annum with a high export potential. Exports can be increased from the present level of Rs. 2,800 crore to Rs. 15,000 crore by 1995 provided steps are taken to develop the hitherto neglected industry, the sources pointed out.

According to processors, the growth of the industry is hampered by lack of co-ordination between the agricultural and industrial sectors. This reflected from the report that about Rs. 3,000 crore worth food is wasted every year in India due to inadequate post harvest handling and absence of direct link between processors and growers. The present installed capacity of the fruits and vegetables processing industry is about seven lakh tonnes of which is only about one third is utilised.

Saying that the market for processing food is in an infant stage, they suggested that careful planning including reduction in duty structure of packaging materials should be done to make the processed foods available at affordable price to the common people.

(Economic Times 9 January 1992, 14)

92 IBRD aid for fruit, veg projects

Ten fruits and vegetables development projects would be set up soon in the country with a World Bank assistance of \$ 500 million, National Dairy Development Board chairman, V.Kurien said on Tuesday.

Dr Kurien said that a seven-member, World Bank team had already visited the country to assess the project proposals.

(Economic Times 20 December 1991, 6)

93 Special monitoring agency for small industries

The Centre will set up a special monitoring agency to ensure that the genuine credit needs of small scale industries sector are fully met, the Union Minister for State for Industries, Prof. P.J. Kurien, said.

Stating that "inadequate and untimely availability of credit", was one of the reasons for SSI units becoming sick, Prof. Kurien called for timely interaction of the banks and financial institutions to identify the sick industrial units with potential for revival.

(Chemical Weekly 37(7), 1991, 86)

94 MRP of coffee for 1992 fixed

The minimum release price (MRP) for Arabica and Robusta varieties of coffee for 1992 has been fixed at Rs. 23.93 and Rs. 19.21 per kg respectively, commerce minister P. Chidambaram announced in Parliament on Friday.

This represents an increase of 11.92 per cent in case of Arabica and 10.91 per cent for Robusta over last year's prices.

Mr. Chidambaram said the gross initial payment to be made to coffee growers under price differential scale for 1991-92 season had been fixed at Rs.11 per point by the Coffee Board on Thursday. It was Rs. nine per point last year.

The minister said the MRP for 1991 was announced in March this year.

Mr. Chidambaram said that based on data sought from 600 estates chosen on a random basis, the cost of cultivation had been worked out at Rs. 14.51 per kg for Arabica and Rs. 10.95 per kg for Robusta. After taking into consideration crop charges, development expenses, return on capital and other charges, the production costs for Arabica and Robusta were worked out at Rs. 23.93 and Rs. 19.21 per kg respectively for MRP.

Last year's MRP prices were Rs. 21.38 and Rs. 17.32 per kg respectively.

MRP formed the basis for fixing the floor price for internal pool sale for auction of coffee by the Coffee Board, the minister said.

Referring to the price differential scale, Mr. Chidambaram also announced that the Coffee Board had decided that the initial payment of Rs. 11 per point under gross initial payment would be made "without deduction of purchase tax".

(The Economic Times 30 November 1991, 16)

95 Consumption of eggs in India

Despite being the world's fifth largest egg producer, India has to go a long way if it is to improve its abysmally paltry consumption of 28 eggs per capita annually to the international standard of 180 eggs per head annually.

The per capita availability of poultry meat is less than 350 grams per annum which is a far cry from the international average of 11 kg per capita annually.

The Union Agriculture Minister, Mr. Balram Jakhar, who inaugurated the five-day conference said egg production in India had gone up from two billion in 1950 to 27 billion in 1990, which was a commendable achievement.

Referring to the imbalances in marketing, Mr. Muralidharan, Secretary, Department of Animal Husbandry and Dairying said, 75 to 80 per cent of all poultry products found their markets in the urban areas while a vast rural market remained untapped.

He said most of the poultry activities had so far been confined to broiler chicken and hen eggs. The time has come to consider promoting other areas of poultry production such as ducks, quails, turkey and geese and guinea, he said.

The technological leap made in the food processing sector would guarantee a vast potential market for poultry farmers, but this development had to be facilitated with infrastructural support in the sphere of transportation, storage, refrigeration and processing, Mr. Muralidharan added.

(Financial Express 5 November 1991, 2)

96 Consumption of milk and milk products (1989-90)

Product	Consumption '000 MT
Liquid milk	23,460
Butter milk	17,600
Dahi (curds)	3,570
Butter (table and country)	210
Ghee	710
Cream	13
Paneer and Cheese	153
Khoa and condensed milk	700
Milk powders including infant milk foods	165
Ice cream	40

(Chemical Weekly 37(11), 1991, 119)

FOOD REGULATION, QUALITY CONTROL AND HYGIENE**97 Prevention of Food Adulteration Rules (5th Amendment), 1991**

G.S.R. 257(E) - Whereas the certain draft rules further to amend Prevention of Food Adulteration Rules, 1955 were published as required by sub-section (1) of section 23 of Prevention of Food Adulteration Act, 1954 (37 of 1954) with the notification of Government of India in the Ministry of Health and Family Welfare (Department of Health) G.S.R. No. 408(E), dated 29th March, 1990 in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i) dated the 29th March, 1990 at pages 1 to 10 inviting objections and suggestions from all persons likely to be affected thereby before the expiry of sixty days from the date on which the said notification was published in the Official Gazette and were made available to the public;

And whereas the copies of the said Gazette were made available to the public on 21st May 1990;

And whereas the objections and suggestions received from the public on the said draft rules have been considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sub-section (1) of section 23 of said Act the Central Government after consultation with Central Committee for Food Standards hereby makes the following rules further to amend the Prevention of Food Adulteration Rules, 1955, namely:-

RULES

1.(1) These rules may be called the Prevention of Food Adulteration (Fifth Amendment) Rules, 1991.

(2) They shall come into force after six months from the date of their publication.

2. In the Prevention of Food Adulteration Rules (hereinafter referred to as the said rules) in sub-rule (2) of rule 37A, for paragraph (a) to the Explanation, the following paragraphs shall be substituted, namely:-

""(a) "Infant food" means any food which may be used for partial or total replacement of breast milk, commonly called breast milk substitute and includes infant milk food, infant formulae and any food suitable as a

complement to breast milk, to meet the nutritional needs of the infant after 4 months of age, commonly called "complementary food", "breast milk supplement" or "weaning food".

(aa) 'Infant' means "a child not more than 12 months of age".

3. After rule 37A of the said rules, following rule shall be inserted, namely:-

"37-B Labelling of infant foods;

Restriction on use of words or pictures on labels of infant foods:

(1) "The package and/or the label and/or the advertisement of infant milk food, infant formula and any other special infant food marketed as breast milk substitutes, shall not have a picture of infant or picture of mother breast feeding infant or other forms of pictures or text which may idealise the use of such product. The terms 'Humanised' or 'Maternalised' or similar expressions shall not be used".

"The package and/or the label and/or the advertisement of infant food shall also not use the word "Full Protein Food", "Complete Food" or "Health Food" or similar expressions".

(2) In addition to the labelling requirements specified under Part-VII and elsewhere under the Prevention of Food Adulteration Rules, 1955, the label and/or advertisement of every infant food package shall bear the following namely:-

A statement, -

(i) in bold capital letter as follows:

"Important Notice - Breast Milk is best for your Baby".

The colour of the statement shall be different from that of background text of label and/or advertisement. The statement shall be prominent and conspicuous in central panel of the label. Whereas in case of weaning food the statement shall be prominent and conspicuous on any panel of the label:

Provided further that in case of weaning food the statement shall be accompanied by the statement "from 4 months of age, give baby cereal food in addition to mother milk".

The types of letters used shall not be less than 5 millimeters in all such declarations made on label.

(ii) indicating the process of manufacture (spray or roller dried) (except in case of weaning foods).

(iii) containing instructions for appropriate and hygienic preparation including cleaning of utensils, bottles and teats.

(iv) warning against health hazards of inappropriate preparation as under, -

"Infant formula/Infant Milk food/Special Infant food - "Warning/Caution - Careful and hygienic preparation of infant food is most essential for health. Do not use fewer scoops than directed, since dilute feedings will not provide adequate nutrients needed by your baby. Do not use more scoops than directed since concentrated feed will not provide the water needed by your baby".

"Weaning food" - "Warning/Caution - Careful and hygienic preparation as per directions given is most essential for good health of your baby",

(v) indicating the approximate composition of nutrients per 100 g of product;

(vi) indicating the energy value in K. Cal/Joules;

(vii) indicating the storage conditions specifically stating "Store in cool and dry place in an air-tight container's;

(viii) containing the feeding chart and direction for use and instruction for discarding left over feed. Instructions for use of measuring scoop be explicit (level or heaped); Quantity per scoop be mentioned.

(ix) indicating the period by which the product is to be consumed;

(x) to the effect that the Protein Efficiency Ratio (PER) shall be minimum 2.5 if the product other than the infant milk food and infant formula is claimed to have high quality protein.

4. In rule 42 of the said rules in sub clause (iii) of clause (B), the following shall be inserted at the end, namely:-

Sweetened condensed milk and other similar products which are not suitable for infant feeding shall not contain any instruction of modifying them for infant feeding".

5. After rule 43 of the said rules, the following rule shall be inserted, namely:

"43-A. Restriction on Advertisement - There shall be no advertisement of any food which is misleading or contravening the provisions of Prevention of Food Adulteration Act, 1954 (C37 of 1954) or the rules made thereunder.

Explanation: The term 'Advertisement' means any visible representation or announcement made by means of any light, sound, smoke or gas".

6. In rule 49 of the said rules after sub-rule (18), the following sub-rule shall be inserted, namely:-

"(19) - No person shall manufacture, sell, store or exhibit for sale an infant milk food, infant formula and milk cereal based weaning food except under Bureau of Indian Standards Certification Mark".

7. In Appendix-B of the said rules, for item A.11.02.18, the following shall be substituted, namely:-

"A.11.02.18 - Infant Milk Food - The material prepared by spray drying or by roller drying of the milk of cow or buffalo or a mixture thereof. The milk may be modified by the partial removal/substitution of different milk solids, carbohydrates, such as sucrose, dextrose and dextrans, maltose and lactose, salts like phosphates and citrates, vitamins A, D, E, B Group, Vitamin C and other vitamins; and minerals like iron, copper, zinc and iodine. The source of iron may be selected from -

Ferrous sulphate, Ferrous citrate,
Ferrous fumerate, Ferrous succinate,
Ferric ammonium citrate, Ferric pyrophosphate".

It shall be free from starch and added anti-oxidants. It shall also be free from dirt and extraneous matter, preservatives and added colour and flavour and from any material which is harmful to human health. It shall not have rancid taste or musty odour. It shall also conform to the following standards namely:-

1.	Moisture, per cent by weight (not more than)	-4.5
2.	Total milk protein, per cent by weight (not less than)	-12.0
3.	Milk fat, per cent by weight (not less than)	-18.0
4.	Total ash, per cent by weight (not more than)	-8.5
5.	Ash insoluble in dilute Hydrochloric acid per cent by weight (not more than)	-0.1
6.	Solubility -	
	(a) Solubility Index maximum -	
	(if roller dried)	- 15.0 ml
	(if spray dried)	- 2.0 ml
	(b) Solubility per cent by weight (not less than)	
	(if roller dried)	85.0
	(if spray dried)	98.5
7.	Vitamin A (as retinol) mcg. per 100 g. (not less than)	- 350
8.	Added Vitamin D (expressed as Cholecalciferol) I.U. per 100 g (not less than)	-180
9.	Iron, mg per 100 g (not less than)	-5.0
10.	Thiamine, mcg per 100 g (not less than)	-185
11.	Nicotinamide, mcg per 100 g (not less than)	- 1160
12.	Riboflavin, mcg per 100 g (not less than)	-275
13.	Vitamin B6, mcg per 100 g (not less than)	-160
14.	Vitamin B12, mcg per 100 g (not less than)	0.7
15.	Folic acid, mcg per 100 g (not less than)	-20

16.	Pantothenic acid, mg per 100 g (not less than)	-1.4
17.	Biotin, mcg per 100 g (not less than)	-7.0
18.	Vitamin C, mg per 100 g (not less than)	35
19.	Vitamin K, mcg per 100 g (not less than)	-18
20.	Copper mcg per 100 g (not less than)	-280
21.	Iodine, mcg per 100 g (not less than)	-20
22.	Manganese (Mn), mcg per 100 g (not less than)	-20
23.	Zinc, mg per 100 g (not less than)	-2.5
24.	Sodium (Na), mg per 100 g (not less than)	-90
25.	Potassium (K), mg per 100g (not less than)	-370
26.	Chloride (Cl), mg per 100 g (not less than)	-250
27.	Phosphorus (P), mg per 100 g (not less than)	-115
28.	Magnesium (Mg), mg per 100 g (not less than)	-22
29.	Calcium (Ca), mg per 100 g (not less than)	-230
30.	Choline, mg per 100 g (not less than)	-32
31.	Bacterial count, per g (not more than)	-40,000
32.	Coliform count	-absent in 0.1 g

It shall be packed in hermetically sealed, clean and sound containers or in flexible pack made from film or combination or any of the substrate made of Board paper, polyethylene, polyester metalized film or aluminium foil in such a way to protect from deterioration.

"It shall be packed in nitrogen or a mixture of nitrogen and carbondioxide".

8. After item A.11.02.18 of the said rules, the following shall be inserted, namely:-

"A.11.02.18.01 - Infant formula means the product prepared by spray drying or roller drying of the milk of cow or buffalo or a mixture thereof. The milk may be modified by the partial removal/substitution of milk fat with vegetable oils rich in poly-unsaturated fatty acids and/or by different milk

solids; carbohydrates such as sucrose, dextrose and dextrans, maltose and lactose; salts such as phosphates and citrates; vitamins A, D, E, B and C group and other vitamins, minerals such as iron, copper, zinc and iodine and others. The source of iron may be selected from -

Ferrous sulfate Ferrous citrate

Ferrous fumarate, Ferrous succinate

Ferric Ammonium citrate, Ferric pyrophosphate".

It shall be free from added starch, added antioxidants, added colour and added flavour. It shall not have rancid taste and musty odour. Vegetable oils rich in polyunsaturated fatty acids shall be added to partially substituted milk fat to an extent that the product shall contain a minimum of 12 per cent by weight of milk fat and a minimum of linoleate content of 1.398 g. per 100 g. of the product.

The product shall also contain a minimum of 0.70 I.U. of Vitamin E per 100 K. Cal.

It shall conform to the following standard, namely -

1. Moisture, per cent by weight (nor more than)	-4.5
2. Total milk protein, per cent by weight (not less than)	-12.0
3. Total fat, per cent by weight (not less than)	-18.0
4. Total ash, per cent by weight (not more than)	-8.5
5. Ash insoluble in dilute Hydrochloride acid per cent by weight (not more than)	-0.1
6. Solubility -	
a) Solubility Index maximum -	
(if roller dried)	- 15.0 ml
(if spray dried)	- 2.0 ml
(b) Solubility per cent by weight (not less than)	
(if roller dried)	85.0
(if spray dried)	98.5

7.	Vitamin A (as retinol) mcg per 100 g. (not less than)	- 350
8.	Added Vitamin D (expressed as cholecalciferol) I.U. per 100 g (not less than)	-180
9.	Iron, mg per 100 g (not less than)	-5.0
10.	Thiamine, mcg per 100 g (not less than)	-185
11.	Riboflavin, mcg per 100 g (not less than)	-275
12.	Nicotinamide, mcg per 100 g (not less than)	-1160
13.	Vitamin B6, mcg per 100 g (not less than)	-160
14.	Vitamin B12, mcg per 100 g (not less than)	0.7
15.	Folic acid, mcg per 100 g (not less than)	-20
16.	Pantothenic acid, mg per 100 g (not less than)	-1.4
17.	Biotin, mcg per 100 g (not less than)	-7.0
18.	Vitamin C, mg per 100 g (not less than)	35
19.	Vitamin K, mcg per 100 g (not less than)	-18
20.	Copper mcg per 100 g (not less than)	-280
21.	Iodine, mcg per 100 g (not less than)	-20
22.	Manganese (Mn), mcg per 100 g (not less than)	-20
23.	Zinc, mg per 100 g (not less than)	-2.5
24.	Sodium (Na), mg per 100 g (not less than)	-90
25.	Potassium (K), mg per 100g (not less than)	-370
26.	Chloride (Cl), mg per 100 g (not less than)	-250
27.	Phosphorus (P), mg per 100 g (not less than)	-115
28.	Magnesium (Mg), mg per 100 g (not less than)	-22
29.	Calcium (Ca), mg per 100 g (not less than)	-230
30.	Choline, mg per 100 g (not less than)	-32
31.	Bacterial count per g (not more than)	-40,000
32.	Coliform count	-absent in 0.1 g

It shall be packed in hermetically sealed, clean and sound containers or in flexible pack made from film or combination or any of the substrate made of Board paper, polyethylene, polyester metallised film or aluminium foil in such a way to protect from deterioration.

It shall be packed in nitrogen or a mixture of nitrogen and carbondioxide.

A 11.02.18.02 - Milk-Cereal based weaning foods:

Milk-cereal based weaning foods are obtained from a variety of cereals vegetable oils and proteins, milk solid different carbohydrates such as sucrose, dextrose, dextrans, maltose and lactose, iron and calcium salts; phosphates and citrates and other nutritionally significant minerals and vitamins. It may also contain fruits and vegetables. It shall be in the form of powder, small granules or flakes, free from lumps and shall be uniform in appearance. The source of iron shall be selected from -

"Ferrous sulphate Ferrous citrate

Ferrous fumerate, Ferrous succinate

Ferric Ammonium citrate, Ferric pyrophosphate".

It shall be free from dirt and extraneous matter and free from preservatives, added colour, flavour and antioxidants. It shall be free from any material which is harmful to human health. It shall contain a minimum of 20 per cent milk solids by weight of the product of which milk fat shall be a minimum of 5 per cent by weight.

It shall conform to the following standards, namely:-

1. Moisture, per cent by weight (not more than)	-5.0
2. Total protein, per cent by weight (not less than)	-12.0
3. Fat, per cent by weight (not more than)	-7.5
4. Total Carbohydrates, per cent by weight (not less than)	- 55.0
5. Total ash, per cent by weight (not more than)	-5.0
6. Ash insoluble in dilute hydrochloric acid per cent by weight (not more than)	0.1

7.	Crude fibre (on dry basis, per cent by weight) (not more than)	-1.0
8.	Vitamin A (as retinol), mcg per 100 g (not less than)	- 350.0
9.	Vitamin C mg. per 100 g (not less than)	-25
10.	Added Vitamin D, mcg per 100 g (expressed as cholecalciferol)	-5
11.	Bacterial count per g (not more than)	-40,000
12.	Coliform count	-absent in 0.1 g

It shall also contain the following -

1.	Thiamine (as hydrochloride), mg per 100 g (not less than)	-0.5
2.	Riboflavin, mg per 100 g (not less than)	-0.6
3.	Nicotinic acid, mg per 100 g (not less than)	-5
4.	Iron, mg per 100 g (not less than)	-5

It shall be packed in hermetically sealed, clean and sound containers or in flexible pack made from film or combination or any of the substrate made of Board paper, polyethylene polyester metallised film or aluminium foil in such a way to protect from deterioration.

[No.P-15014//5/86-PH(F&N)]

BALBIR SINGH, Jt. Secy.

(The Gazette of India Part II, Section-3-sub-section(i), No.185, 1991, 6-11)

98 Prevention of Food Adulteration (4th Amendment) Rules 1990

G.S.R. 281(E) - Whereas certain draft rules further to amend the Prevention of Food Adulteration Rules, 1955 were published as required by sub-section (1) of Section 23 of Prevention of Food Adulteration Act, 1954 (37 of 1954) in the Notification of Government of India in the Ministry of Health and Family Welfare (Department of Health) No.G.S.R. 50(E) dated the 5th Feb 1990 in the Gazette of India, Extraordinary Part-II Section 3, Sub-section (i) dated the 5th February 1990 at pages 1-13, inviting objections and

suggestions from all persons likely to be affected thereby, before the expiry of sixty days from the date on which copies of the Gazette of India in which the said notification was published, was made available to the public;

And whereas the copies of the said Gazette were made available to the public on 14th May 1990.

And whereas the objections and suggestions received from the public on the draft rules have been considered by the Central Government;

Now, therefore, in exercise of the powers conferred, by sub-section (1) of section 23 of the said Act, the Central Govt. after consultation with Central Committee for Food Standards, hereby makes the following rules further to amend the Prevention of Food Adulteration rules, 1955 namely:-

RULES

1.(1) These rules may be called the Prevention of Food Adulteration (fourth Amendment) Rules, 1990.

(2) They shall come into force after sixth month from the date of their publication in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955, in Appendix B, for item A.18.06, the following shall be substituted, namely:-

A.18.06 - Foodgrains meant for human consumption shall be whole or broken kernels of cereals, millets and pulses. In addition to the undermentioned standards to which foodgrains shall conform, they shall be free from argemonemexicana and kesari in any form. They shall be free from added colouring matter. The foodgrains shall not contain any insecticide residues other than those specified in column (2) of the table of rule 65 and the amount of insecticide residue in the foodgrains shall not exceed the limits specified in column (4) of the said Table.

A.18.06.01-Wheat:

Description - Wheat shall be the dried mature grains of *Triticum aestivum* Linn. or *Triticum vulgare* vill, *Triticum durum* Desf, *Triticum sphaerococcum* perc., *Triticum dicoccum* schubl., *Triticum Compactum* Host. It shall be sweet, clean and wholesome. It shall also conform to the following standards, namely:

(i) Moisture - Not more than 14 per cent by weight (obtained by heating the pulverised grains at 130°C for two hours).

(ii) Foreign matter - Not more than 3 per cent by weight out of which inorganic matter and poisonous seeds, shall not exceed 1.0 and 0.5 per cent by weight, respectively. Out of total limit of poisonous seeds, dhatura and akra (Vicia species) shall not exceed 0.025 and 0.2 per cent by weight respectively.

(iii) Other edible grains - Not more than 6 per cent by weight

(iv) Damaged grains - Not more than 6.0 per cent by weight including kernel bunt affected grains and ergot affected grains. The limit of Karnal bunt affected grains, ergot affected grains shall not exceed 3.0 per cent and 0.05 per cent by weight, respectively.

(v) Weevilled grains - Not more than 10 per cent by count.

(vi) Uric acid - Not more than 100 mg. per kg.

(vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 12 per cent by weight.

A.18.06.02 - Maize:

Maize shall be the dried mature grains of *Zea mays* Linn. shall be sweet, hard clean and wholesome. It shall also conform to the following standards, namely-

(i) Moisture - Not more than 16.0 per cent by weight (obtained by heating the pulverised grains at 130 C - 133 C for two hours).

(ii) Foreign matter - Not more than 4 per cent by weight out of which inorganic matter and poisonous seeds shall not exceed 1.0 and 0.5 per cent by weight respectively. Out of total limit of poisonous seeds, dhatura and akra (vicia species) shall not exceed 0.025 and 0.2 per cent by weight respectively.

(iii) Other edible grains - Not more than 3 per cent by weight.

- (iv) Damaged grains - Not more than 5 per cent by weight.
- (v) Weevilled grains - Not more than 10 per cent by count.
- (vi) Uric acid - Not more than 100 mg. per kg.
- (vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 9 per cent by weight.

A.18.06.03 Jawar and Bajra:

Jawar and Bajra shall be the dried mature grains of *Sorghum Vulgare* Pers, and *Pennisetum-typhoideum* Rich, respectively. These shall be sweet, hard, clean and wholesome. These shall also conform to the following standards namely:-

- (i) Moisture-Not more than 16.0 per cent by weight (obtained by heating the pulverised grains at 130°C - 133°C for two hours).
- (ii) Foreign matter - Not more than 4 per cent by weight out of which inorganic matter and poisonous seeds shall not exceed 1.0 and 0.5 per cent by weight, respectively. Out of total limit of poisonous seeds, dhatura and akra (*Vicia* species) shall not exceed 0.025 and 0.2 per cent by weight, respectively.
- (iii) Other edible grains - Not more than 3 per cent by weight.
- (iv) Damaged grains - Not more than 6 per cent by weight out of which ergot affected grains shall not exceed 0.05 per cent by weight.
- (v) Weevilled grains - Not more than 6 per cent by weight.
- (vi) Uric acid - Not more than 100 mg. per kg.
- (vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 10 per cent by weight.

A.18.06.04 - Rice:

Rice shall be the mature kernels or pieces of kernels of *Oryza sativa* Linn. obtained from paddy as raw or parboiled. It shall be dry, sweet, clean, wholesome and free from unwholesome poisonous substance. It shall also conform to the following standards, namely:-

(i) Moisture - Not more than 16 per cent by weight (obtained by heating the pulverised grains at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 3 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Damaged grains - Not more than 5 per cent by weight (excluding discoloured tip).

(iv) Weevilled grains - Not more than 10 per cent by count.

(v) Uric acid - Not more than 100 mg. per kg.

(vi) Mycotoxin including aflatoxin - Not more than 30 microgram per kilogram:

Provided that the total of foreign matter and damaged grains shall not exceed 6 per cent by weight.

A.18.06.05 - Masur Whole:

Masur whole shall consist of lentil (*Lens culinaris* Medik or *Ervum lens esculenta* Moench). It shall be sound, dry, sweet, clean and wholesome. It shall conform to the following standards, namely:-

(i) Moisture - Not more than 14 per cent by weight (obtained by heating the pulverised grains at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 3 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Other edible grains - Not more than 3 per cent by weight

(iv) Damaged grains - Not more than 5 per cent by weight.

(v) Weevilled grains - Not more than 6 per cent by count.

(vi) Uric acid - Not more than 100 mg. per kg.

(vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible and damaged grains shall not exceed 8 per cent by weight.

A.18.06.06 - Urd Whole

Urd whole shall consist of seeds of the pulses (*Phaseolous mungo* Linn). It shall be sound, dry, sweet and wholesome. It shall also conform to the following standards, namely:-

(i) Moisture - Not more than 14 per cent by weight (obtained by heating the pulverised grains at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 3 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Other edible grains - Not more than 4 per cent by weight.

(iv) Weevilled grains - Not more than 6 per cent by count.

(v) Damaged grains - Not more than 5 per cent by weight.

(vi) Uric acid - Not more than 100 mg. per kilogram.

(vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 9 per cent by weight.

A.18.06.07 - Moong whole

Moong whole shall consist of seeds of green gram (*Phaseolous aurues* Roxb., *Phaseolous radiatus* Roxb). It shall be sound, dry, sweet, wholesome and free from admixture of unwholesome substances. It shall also conform to the following standards, namely:-

(i) Moisture - Not more than 14 per cent by weight (obtained by heating the pulverised pulses at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 3 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Other edible grains - Not more than 4 per cent by weight

(iv) Damaged grains - Not more than 5 per cent by weight.

(v) Weevilled grains - Not more than 6 per cent by count.

(vi) Uric acid - Not more than 100 mg per kilogram

(vii) Mycotoxin including aflatoxin - Not more than 30 microgram per kilogram:

Provided that the total of foreign matter, other edible and damaged grains shall not exceed 9 per cent by weight.

A.18.06.08 - Chana Whole:

Chana whole shall be the dried grains of gram (*Cicer arietinum* Linn). It shall be sound, clean, sweet, wholesome and free from unwholesome substances. It shall also conform to the following standards namely:-

(i) Moisture - Not more than 16 per cent by weight (obtained by heating the pulverised pulses at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 3 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Other edible grains - Not more than 4 per cent by weight.

- (iv) Damaged grains - Not more than 5 per cent by weight .
- (v) Weevilled grains - Not more than 10 per cent by count.
- (vi) Uric acid - Not more than 100 mg. per kilogram.
- (vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 9 per cent by weight.

A.18.06.09 - Split Pulse (Dal) Arhar:

Dal Arhar shall consist of husk and split seeds of red gram (*Cajanus cajan* (L) Millsp). It shall be sound, clean, sweet, dry wholesome and free from admixture of unwholesome substance. It shall also conform to the following standards, namely:-

- (i) Moisture - Not more than 14 per cent by weight (obtained by heating the pulverised pulses at 130 °C - 133 °C for two hours).
- (ii) Foreign matter - Not more than 2 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.
- (iii) Other edible grains - Not more than 0.5 per cent by weight.
- (iv) Damaged grains - Not more than 5 per cent by weight.
- (v) Weevilled grains - Not more than 3 per cent by count.
- (vi) Uric acid - Not more than 100 mg. per kilogram.
- (vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 6 per cent by weight.

A.18.06.10 - Split Pulse (Dal) Moong:

Dal Moong shall consist of split seeds of green grams (*Phaseolus aureus* Roxb, *Phaseolus radiatus* Roxb). It shall be sound, clean, sweet, wholesome and free from unwholesome substances. It shall also conform to the following standards, namely:-

(i) Moisture - Not more than 14 per cent by weight (obtained by heating the pulverised pulses at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 2 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Other edible grains - Not more than 4 per cent by weight.

(iv) Damaged grains - Not more than 5 per cent by weight .

(v) Weevilled grains - Not more than 3 per cent by count.

(vi) Uric acid - Not more than 100 mg. per kilogram.

(vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible and damaged grains shall not exceed 8 per cent by weight.

A.18.06.11 - Split pulse (Dal) Urd:

Dal Urd shall consist of split seeds of pulse (*Phaseolus mungo* Linn). It shall be sound, dry, sweet, wholesome and free from admixture of unwholesome substances. It shall also conform to the following standards, namely:-

(i) Moisture - Not more than 14 per cent by weight, (obtained by heating the pulverised grains at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 2 per cent by weight, out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Other edible grains - Not more than 4 per cent by weight.

(iv) Damaged grains - Not more than 5 per cent by weight.

(v) Weevilled grains - Not more than 3 per cent by count.

(vi) Uric acid - Not more than 100 mg. per kilogram.

(vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 8 per cent by weight.

A.18.06.12 - Dal Chana:

Dal Channa shall consist of split grains of gram (*Cicer arietinum* Linn). It shall be sound, clean, sweet, dry, wholesome and free from admixture of unwholesome substances. It shall also conform to the following standards, namely:-

(i) Moisture - Not more than 16 per cent by weight (obtained by heating the pulverised pulses at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 2 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Other edible grains - Not more than 2 per cent by weight.

(iv) Damaged grains - Not more than 5 per cent by weight .

(v) Weevilled grains - Not more than 3 per cent by count.

(vi) Uric acid - Not more than 100 mg. per kilogram.

(vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 7 per cent by weight.

A.18.06.13 - Split pulse (Dal) Masur:

Dal masur shall consist of dehusked whole and split seed of the lentil (*Lens esculenta* Moench or *Lens culinaris* Medik or *Ervum lens* Linn). It shall be sound, clean, dry, sweet, wholesome and free from admixture of unwholesome substances. It shall also conform to the following standards, namely:-

(i) Moisture - Not more than 14 per cent by weight (obtained by heating the pulverised pulse at 130 °C - 133 °C for two hours).

(ii) Foreign matter - Not more than 2 per cent by weight out of which inorganic matter shall not exceed 1 per cent by weight.

(iii) Other edible grains - Not more than 2 per cent by weight.

(iv) Damaged grains - Not more than 5 per cent by weight .

(v) Weevilled grains - Not more than 3 per cent by count.

(vi) Uric acid - Not more than 100 mg. per kilogram.

(vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 7 per cent by weight.

A.18.06.14 - Any other foodgrains not specified above shall conform to the following standards, namely:-

(i) Moisture - Not more than 16 per cent by weight (obtained by heating the pulverised grains at 130° C - 133 °C for two hours).

(ii) Foreign matter - Not more than 6.0 per cent by weight out of which inorganic matter and poisonous seeds shall not exceed 1.0 and 0.5 per cent by weight, respectively. Out of the total limit of poisonous seeds, dhatura and akra (*Vicia* species) shall not exceed 0.025 and 0.2 per cent by weight respectively.

(iii) Other edible grains - Not more than 6 per cent by weight.

(iv) Weevilled grains - Not more than 10 per cent by count.

(v) Damaged grains - Not more than 5 per cent by weight.

(vi) Uric acid Not more than 100 mg. per kg.

(vii) Mycotoxin including aflatoxin - Not more than 30 micrograms per kilogram:

Provided that the total foreign matter, other edible grains and damaged grains shall not exceed 12.0 per cent by weight.

Explanation - For the purposes of items 18.06 to 18.06.14:-

(a) "foreign matter" means any extraneous matter other than foodgrains comprising of -

(i) inorganic matter consisting of metallic pieces, sand, gravel, dirt, pebbles, stones, lumps of earth, clay and mud, animal filth and in the case of rice, kernels or pieces of kernels, if any, having mudsticking on the surface of the rice, and

(ii) organic matter consisting of husk, straws, weed seeds and other inedible grains and also paddy in the case of rice.

(b) Poisonous, toxic and/or harmful seeds-means any seeds which if present in quantities above permissible limit may have damaging or dangerous effect on health, organoleptic properties or technological performance such as datura (*D. fastuosa* linn and *D. stramonium* linn). corn cokle (*Agrostemma githagol*, *Machai Lallium remulenum* linn). Akra (*Vicia* species).

(c) "Damaged grains" means kernels or pieces of kernels that are sprouted or internally damaged as a result of heat, microbe, moisture or weather, viz, ergot affected grain and karnal bunt grains;

(d) "Weevilled grains" means kernels that are partially or wholly bored by insects injurious to grains but does not include germ eaten grains and egg spotted grains;

(e)"Other edible grains" means any edible grains (including oil seeds) other than the one which is under consideration.

[No.P.15014/3/88-PH(F&H)PFA]

BALBIR SINGH, Jt. Secy.

(*The Gazette of India, Part II-Section-3-Sub-section (i) No.199, 1991, 7-11*)

99 Bioengineered chymosin

Pfizer Inc. (New York, USA) is the first company to get the FDA approval to use a genetically engineered bacterium for making a food ingredient. The product, the mammalian enzyme chymosin, also known as calf rennin, is widely used by the dairy industry as a milk clotting agent (in cheese making) and to curdle milk into curds and whey.

Traditionally chymosin is extracted from the stomachs of new born calves. In contrast, Pfizer has implanted the calf gene, carrying the genetic code for chymosin into K-12 strain of E.coli. This modified bacterium is then induced to express recombinant chymosin that is purer than its natural counterpart. The company has scaled up the process and is producing chymosin under the name Chy-Max, at a new fermentation plant in Terre Haut, Indiana. Chy-max has already won approval in Australia.

(*Chemical Weekly 36(52), 1991, 98*)

100 Ajinomoto (MSG) faces ban in food uses

Monosodium glutamate (MSG), popularly known as Ajinomoto is a well established flavour booster extensively used in soups, biscuits, chinese foods and noodles. Recent studies have shown that its use causes brain damage to children below 12 years in age. It also causes in adults what is known as 'Chinese restaurant syndrome'. The chemical is known to boost flavour of food artificially by 3,000-4,000 times.

Nearly 35 countries have banned its use in food products and USA is also considering its ban. Recently clinical studies in Britain have confirmed the link between MSG and damage to brain cells in children.

The International Organisation of Consumer Unions (IOCU) of Penang, Malaysia has recently appealed to governments worldwide to ban its use and save unsuspecting consumers especially children.

The Confederation of Indian Consumers Organisation is planning to start a campaign for banning MSG use in foods.
(*Chemical Weekly* 37(12), 1991, 104)

101 Fresh battle over safety of altered foods

Qualms about genetic engineering have resurfaced in the US as the government tries to decide how to regulate genetically engineered food.

Britain approved an engineered yeast for making bread last year. The US followed with chymosin, a milk-clotting enzyme made by genetically engineered bacteria. Some 35 per cent of American cheese is now made with the commercial version, called Chymax. More foods will soon be introduced, such as oils that are low in unsaturated fat, fish that grow fast on mammalian hormones and plants with built-in pesticides.

But these products may remain on the shelf if the Environment Defense Fund (EDF) has its way. The pressure group has petitioned the government to apply its rules for chemical additives to any food that has been altered by genes made in the laboratory.

The Food and Drug Administration (FDA) has no specific criteria for judging the safety of genetically engineered food. These products may be considered simply a new food, a food "generally regarded as safe", or as a food additive. Rules for food additives, designed for chemicals such as saccharin, demand the most extensive proof of safety from their makers.

The EDF wants all the products of altered or introduced genes - so called expression products - that end up in food to be considered additives. They also want these rules to apply where the food has been changed by genetic engineering, even if no expression products are present in the final product - for instance, an oil which is low in fat because the plant it comes from has been engineered to produce low-fat oil.

No one has shown that genetically altered foods are safe, says Rebecca Goldberg of the EDF. On the other hand, no one has shown them to be unsafe, says Alan Goldhammer of the Industrial Biotechnology Association, which opposes the EDF's petition.

The EDF points to the case of the nutritional supplement L-tryptophan, which caused 27 deaths and 1500 cases of serious illness in 1990. L-tryptophan was made by a genetically engineered bacterium created by a

Japanese company, Showa Denko. No evidence so far proves that the gene alteration was at fault. But Goldberg suggests other kinds of complications that might be associated with genetically engineered foodstuffs. A new gene in a plant could increase the plant's production of natural toxins. Or it could alter the nutritional value of the food.

One new food soon to reach the shops is transgenic fish made to grow faster with the help of mammalian growth hormones. The EDF says that transferring genes for growth hormone from mammals into fish has "obvious potential to harm humans". Rex Dunham at Auburn University in Alabama has done exactly this with several species of fish, and disagrees: "The DNA performs a very specific function regardless of the source.. besides, we eat mammals with growth hormone all the time".

The biotechnology industry is just as keen on having the rules clarified as the EDF, otherwise there is likely to be a backlog of products waiting for approval. But they say EDF goes too far. An industrial consortium has offered a plan that would treat genetically engineered substances the same way as those produced through breeding. They say that the strictest type of regulations should be applied only to foods with altered genes which produce substances that would be considered food additives if they were made conventionally.

Food additives such as colourings and sweeteners can take years to approve, says James Maryanski of the FDA. New foods, on the other hand, may go directly to market with little oversight.

The FDA is due to decide its new policy for genetically engineered foods by January. Whatever it decides, responsibility for regulating new foods is likely to be complicated. The Environmental Protection Agency, for example, would investigate genetic changes meant to confer pest resistance to, say, apple trees. If another genetic alteration affects how nutritious the apples are, however, the FDA would review it.

(New Scientist No.1793, 1991, 15)

102 The FAO report on protein quality

The Food & Agricultural Organisation (FAO) of the United Nations and the WHO have recently published the Report of the joint FAO/WHO Consultation on Protein Quality Evaluation. The Report recommends the adoption of a digestibility connected amino acid score based on the amino acid pattern of the 2-3 years old child in the reference scoring pattern to define the protein quality of foods for children and adults.

Copies of the Report are available at a nominal amount of postage charges from Dr. Ezzendrine, Boutrif, Food Policy and Nutrition Div. FAO, Viadelle Termedi Caracule, Rome, Italy.
(*Chemical Weekly* 37(3), 1991, 97)

103 Malnutrition declining: survey

Severe and moderate degrees of malnutrition among children have declined over the past one and half decades. But the overall dietary picture leaves much scope for improvement, a recent survey shows.

The incidence of Kwashiorkor and Marasmus, extreme forms of protein deficiency, was less than one per cent during recent surveys, compared to one to three per cent during the 70's.

Similarly, vitamin A deficiency declined from five to two per cent, and vitamin B complex deficiency from 10 to five per cent, according to the study by the National Institute of Nutrition (NIN), Hyderabad.

NIN's national nutrition monitoring bureau collected data on diet and nutritional status covering 500 rural households, every year in Andhra Pradesh, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh and West Bengal from 1974 to 1989.

The survey showed that severe and moderate degrees of malnutrition among children declined over the period with a corresponding increase in the proportion of children who are only mildly malnourished and those having normal weight.

During 1975-1980, the aggregated data showed an upward trend in the average calorie consumption of rural population, especially in the lowest income group (landless agricultural labourers).

(*Economic Times* 13 October 1991, 4)

104 Barley diet reduces cholesterol levels in humans

Experiments by researchers at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) have shown that a barley diet can reduce cholesterol levels in humans by as much as 12%.

The study revealed that barley grains have a higher and more even distribution of cholesterol-lowering beta-glucan than oats and oat bran.

Dr. Graeme McIntosh of CSIRO, says the study, combined with new milling methods and more attractive means of presenting barley, may see barley returning to a more prominent place on the meal table.

In the study, three new foods, barley, barley muesli, barley bread and barley pasta were used.

The barley foods led to a 6% reduction in total blood cholesterol and a 7% lowering of low-density lipoprotein, which is closely linked with heart disease.

The results evidently show the health potential of barley foods and of beta-glucan.

(Journal of Scientific and Industrial Research, 50, 1991, 987)

105 Preventing tooth decay

Japanese researchers have found that oil and other extracts from the cashew shell are anti-microbial against gram positive bacteria, particularly *Streptococcus mutans* which causes tooth decay. In addition to killing the bacteria, the substances also appear to decrease the production of cavity-causing acids by the bacteria. The shell oil is not edible, but could be included in toothpastes or mouthwash. The anti-cavity factors are also found in cashewnuts.

(Business World 9-22 October 1991, 13)

106 Refined green tea extract

Tokyo-based Nippon Mining Co Ltd (Japan) has applied to the Ministry of Health and Welfare for approval to manufacture and market Camellia Soex a refined green tea extract as a health beverage. Camellia Soex is reported to be effective in preventing hypertension. It contains the natural lipid oxidant, catechin, as well as vitamins, organic salts and polysaccharides. Nippon Mining will target the extract at processed food manufacturers, as an additive for health foods and beverages.

(Chemical Weekly 36(52), 1991, 99)

107 A cup of green tea a day may keep cancer away

Green tea may help to ward off cancer. Evidence for the anticancer properties of unfermented tea comes from research in Japan and the US, where tea-drinking mice have been found to develop fewer cancers of the stomach, lung, liver and skin.

Scientists from Rutgers University, the American Health Foundation and the cancer centre of Tokyo reported a series of studies on green tea at last month's meeting of the American Chemical Society in New York. Japanese scientists called one tea extract "a practical cancer chemopreventive agent to be implemented in everyday life". The leading tea researcher in the US, Allan Conney of Rutgers, was more cautious: "It's too early to advocate drinking large amounts".

Conney exposed groups of mice to various cancer-inducing treatments while giving them tea to drink instead of water. Whatever the treatment, the tea-drinking mice developed fewer cancers than a control group of mice. Skin cancers resulting from exposure to ultraviolet radiation were reduced by between 39 and 87 per cent compared to controls, and the incidence of stomach cancers and lung cancers was about 50 per cent lower among tea-drinkers.

Similar results were reported from the American Health Foundation in Valhalla, New Jersey. Scientists there exposed mice to the nitrosamine NNK, which is one of the main carcinogens in cigarette smoke. Mice that were given tea developed fewer cancerous tumours than those that were not.

Scientists at the Japanese National Cancer Centre Research Institute have isolated a chemical in green tea which they believe is responsible for fighting cancer. The extract is called (-)epigallocatechin gallate or EGCG. When green tea is fermented to make black tea, most of the EGCG disappears. Hirota Fujiki, chief of the cancer prevention division at the institute, says that mice receiving EGCG were far more resistant to the effects of chemical carcinogens both in their diet or applied to their skin.

Another experiment carried out at Rutgers University may help to explain how tea protects cells against cancer. Conney treated mouse skin with polyphenols, which are present in green tea, before applying the carcinogenic chemical 12-O-tetradecanoylphorbol-13-acetate (TPA). The polyphenols dramatically inhibited the release of free radicals, which have been implicated in triggering cancer.

Quite how these results tie in with findings among humans is not clear. Fung-Lung Chung of the American Health Foundation speculates that the tradition of drinking green tea may be one reason why lung cancer is rare in Japan, despite the fact that the Japanese smoke prodigious amounts of tobacco. On the other hand stomach cancer is much more common in Japan than in other countries where people prefer to drink fermented black tea.
(*New Scientist* 14 September 1991, 17)

108 Shrunk glands spark sweetener controversy

A consumer group in the US has expressed doubts about the safety of sucralose, a sweetener which was approved for sale in Canada in September. The Center for Science in the Public Interest (CSPI), a group based in Washington DC, has called for additional toxicological studies to establish whether the sweetener is likely to damage the immune system.

Experiments on rats have shown that animals fed a diet rich in sucralose have suffered shrunken thymuses. The thymus gland plays a key role in the immune system. Several other findings - such as enlargement of the liver and kidneys in some animals receiving sucralose - require explanation, say scientists working for the centre. They also want further tests to establish whether sucralose will harm diabetics, who consume more sweeteners than most.

Many of the group's anxieties are shared by the Scientific Committee for Food, the regulatory body which issues approval for the sale of sweeteners in Europe. In 1988, the SCF published a summary of its reservations about sucralose and requested additional studies and data to resolve outstanding questions of safety.

But the two companies that developed sucralose, Tate & Lyle in Britain and Johnson & Johnson in the US have already satisfied the US Food and Drug Administration that the sweetener is safe. They expect approval from the FDA next spring.

The CSPI notified the FDA of its concerns about sucralose and asked for a meeting to discuss them. The FDA rejected the request, says Lisa Lefferts, a scientist at the Centre. "Given the data and the large number of people in the US with a compromised immune system, we believe it is important to further evaluate the effects of sucralose on the immune system," she says.

The manufacturers attribute the shrinkage of thymuses in rats to the animals' refusal to eat food containing large quantities of sucralose rather than to any metabolic effects of the sweetener. In large doses, it is unpleasant to eat and a shrinking thymus is a symptom of starvation, they say.

The CSPI rejects this interpretation of the experimental results. "You have to really starve the animals severely to achieve the kind of shrinkages you see in sucralose-fed rats," says Lefferts. "So we remain unconvinced".

Judith Bellin, a toxicologist hired by the centre to trawl through the manufacturers' submissions on sucralose to the FDA, concluded that sucralose is toxic to "immature" rat thymuses. Bellin reviewed studies on rats starved under experimental conditions, and concluded that their growth rate could be reduced by as much as a third without the thymus losing a significant amount of weight (less than 7 per cent). The changes were much more marked in rats fed on sucralose. While the animals' growth rate was reduced by between 7 and 20 per cent, their thymuses shrank by as much as 40 per cent.

Tate & Lyle dismisses the centre's fears about shrinking thymuses. "It's an interesting physiological problem, but not a safety problem. It has been resolved as not being of any toxic or safety significance," says Lesley Yeomans of Tate & Lyle.

Both manufacturers say that the issues raised by the centre are not new and have been resolved to the satisfaction of the FDA, the Canadian Health Protection Branch and the Joint Expert Committee on Food Additives of the WHO and the Food and Agriculture Organization.

"The Canadians were aware of the CSPI, but despite the challenge, they went ahead and approved it," says Sam Molinary, director of scientific affairs at Tate & Lyle. The company acknowledges that it may have to do more to satisfy Europe's SCF, however, "We are committed to doing more if necessary to satisfy the regulatory authorities, even if it were necessary to do additional studies," says yeomans.

In its summary on sucralose published in 1988, the SCF wrote: "The decrease in thymus weight observed occasionally in the rat studies was, on the evidence provided, not entirely explainable by the effects of undernutrition or stress. However, no apparent adverse effect on the function of the immune system had been observed so that in the opinion of the committee, the biological significance of the thymic findings still remains unclear".

The committee and the CSPI also want more data on the mutagenic properties of 1,6-dichlorofructose, a breakdown product of sucralose. Trace amounts of 1,6-dichlorofructose are sometimes found in canned drinks left to stand for several months. John Howlett, the secretary of the SCF, says: "If they (Tate & Lyle) wanted to get the committee to give its endorsement, they should answer those issues".

(New Scientist No.1796, 1991, 13)

109 Diet provides protection against cancer

Prof. Philip James of the Rowett Research Institute in Aberdeen, Scotland has evidenced that the correct diet can provide protection against cancer.

Studies have shown that fresh vegetables and fruit, high in vital vitamins, have an ability to significantly reduce cancers in laboratory animals given known carcinogens. Extensive human investigations have also revealed lower cancer rates in those who have this kind of diet.

Prof. James says, that the precise action of such a diet in providing protection against cancers is not simply a question of vitamins and it is known that if you give rats a carcinogen, but you have them on a low-fat, high fruit and vegetable diet, then those rats would have far fewer cancers. We do not necessarily know the exact extract responsible but the evidence is sufficient to warrant advocating such diets.

It is also shown that smokers who regularly eat fresh vegetables might significantly reduce their risk of lung cancer. Avoid smoking is by far and most effective way to guard against lung cancer. The studies made till now suggest that the intake of green and yellow vegetables tends to reduce the risk from smoking. It is about 20% reduction.

There is also evidence to suggest that diet could protect against breast cancer. A study in Athens has shown that women with the highest fresh vegetable intake had a breast cancer rate that was one-eighth of those women with a low vegetable intake.

The importance of a low-fat diet in avoiding heart disease has now been recognized by medical doctors and Prof. James says the same emphasis should now be put on the value of a low-fat, fruit, vegetable and a whole grain diet for cancer protection. He recommends daily intake of healthy foods in five portions, adding: An apple or banana, or a heap of baked beans, or a pile of brussel sprouts is one portion.

(Journal of Scientific and Industrial Research, 50, 1991, 987)

110 A new fat substitute

A new unusual fat substitute based on protein and derived from a form of corngluten called Zain has been under development by researchers at Opta Food Ingredients Inc of Cambridge, Mass. The company received a process patent (US Patent 5,021,248) recently for the product but has not approached FDA for the approval.

Called 'Lita' the new fat mimetic works on a microencapsulation technology that is similar in concept employed in production of Simplese (Monsanto) and Stellar (A.E. Staley). The company claim that the molecule is similar in shape, texture and distribution to that of a round fat molecule.

Microencapsulation, also called microparticulated products is a relatively new entry in the field of fat replacers and food processors are hard pressed to say how the category will ultimately size up the growing market of fat mimetics. Monsanto's Simplese was the first product to be marketed in this category.

Opta Food Ingredients will soon be setting up pilot plant for the production of Lita from Zain, which at present is a relatively small volume product of high price (around \$20 and \$ 25). The company will have to make arrangement for the bulk production of Zain with some company at the lowest possible prices.

Opta has come to an understanding with Pfizer Inc. for the R&D and commercial development of Lita. Authorities point out that Lita will have to produce better mouth-feel, texture and above all taste and a low price to succeed commercially as a fat mimetic.

(Chemical Weekly, 37(8), 1991, 92)

111 Wastewater generation and specific BOD load in representative meat processing units

Type	Category	Combined wastewater		Spec. Pollution Load (Kg. BOD/TON)			Spec. Solid Waste (Kg/TON)			
		Flow	M ³ /ton	BOD* Kg/d	Before		% Reduction	Before		% Reduction
					Abate-ment	After Abate-ment		Abate-ment	After Abate-ment	
Frozen Meat	Large	57.0	1.90	35.8	1.2	1.0	17%	1100	900	18%
	Medium	28.5	1.95	18.0	1.2	1.0	17%	1200	900	25%
	Small	9.5	2.00	6.0	1.2	1.0	17%	1100	900	18%
Processed	Class-A									
	Pig	58.2	11.6	90.0	18.0	10.8	40%	399	260	33%
	Poultry	155.0	20.8	166.0	20.7	12.0	42%	300	200	33%
	Class-B	2.2	8.8	1.8	7.2	6.0	17%	67	40	40%
	Class-C	1.3	6.5	2.6	13.0	10.0	23%	42	40	5%

*Characteristics are based on the flow monitoring and composite wastewater sample collected during whole operation.
(Productivity 32(1), 1991, 174)

TRANSFER OF TECHNOLOGY AND NEW INDUSTRIES

112 Sakti Soyas to produce edible soya flour

Sakti Soyas Limited, a venture promoted jointly by the Sakthi Group and the Tamil Nadu Industrial Development Corporation (Tidco), is set to produce 15,000 tonnes of edible soya flour annually.'

The Rs.25 crore project, using German and Swiss technology, would ensure that the traditional beanie flavour associated with soya product is eliminated. Besides soya flour, the company also manufactures soyabean refined oil and meal used in the making of cattle, poultry and shrimp feeds. The focus would however be on soya flour.

(The Economic Times 16 October 1991, 4)

113 India's first vitaminised milk scheme inaugurated

India's first vitaminised milk scheme started by the Food Dept. was inaugurated recently at Mother Dairy (New Delhi) and later will be extended to the Delhi Milk Scheme. Inadequate intake of Vit. A is the main cause behind ocular diseases like impairment of vision, blindness, xerophthalmia, and other nutritional diseases.

In the milk supplied by organised dairies throughout India the fat is extracted to a great extent during processing. This results in poor content of Vit. A in milk.

(Chemical Weekly 36(52), 1991, 99)

114 Lactose India to set up new plant

Lactose India Ltd. is setting up a project to manufacture 465 tpa of lactose. This 100 per cent import substitute project is being set up at Poicha village, in Vadodara district of Gujarat. Commercial production is expected to commence in April 1992.

Presently, the entire estimated demand of around 5,000 tonnes is being met by costly imports. The company will be manufacturing only around 10 per cent of the demand. The 100 per cent indigenous plant and technology has been provided by Alfa Laval (India).

(Chemical Weekly 37(4), 1991, 50)

115 Protein Foods' new project

Protein Foods Inc, the US-based multinational has proposed to go ahead with the multi-crore chicken processing project in Kerala, for which the company has entered into a memorandum of understanding with the Kerala State Industrial Development Corporation. The Kerala Government has already assured all support and assistance for the project. Mr. Smith had also held discussions with the Marine Product Export Development Authority in Cochin.

(Chemical Products Finder 10(5), 1991, 162)

116 Vital foods plans new products

Vital Foods Ltd (VFL) has undertaken an expansion-cum- diversification programme of Rs.27.35 crores for its dairy product farm at Palgarh near Bombay.

Work for the project would commence by December 1991 and was expected to be completed by June 1992.

This would enable VFL to increase its capacity of dairy products to 750 tonnes per annum (TPA) from its present 450 TPA.

The company would manufacture new products like complete tea, chocolate milk shake powder and mango milk shake powder.

(Financial Express 28 October 1991, 12)

117 New paddy processing unit

A project of Rs. 64 crore under joint sector paddy processing unit in Assam in partnership with Assam Industrial Development Corporation Limited (ASIDC) is coming up. The plant will have a capacity to process five lakh tonne of paddy per annum and 50,000 tonnes of rice bran. The unit will also be equipped with an edible oil refinery, targetted turnover in the first full year of operations in Rs. 100 crore.

Another venture is a solvent extraction cum vanaspati plant in collaboration with Arunachal Pradesh Industrial Development and Financial Corporation Limited (APIDFC) at a cost of Rs. 20 crore.

(Economic Times 4 January 1992, 5)

PERSONALIA

118 Nandakumar, new CMD of Spices Corporation

Spices Board Chairman T. Nandakumar assumed additional charge as Chairman and Managing Director of the Spices Trading Corporation according to an official release.

(Economic Times 16 February 1992, 15)

STATEMENT ABOUT "FOOD DIGEST"

FORM IV

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FOOD IRRADIATION - A NEW FRONTIER IN FOOD TECHNOLOGY

Dr. P.M. Nair, Head, FT & EED, BARC

Production of food by improved agricultural practices alone does not alleviate the food shortage. It is imperative that produced food must be preserved efficiently using all available alternatives of food preservation. For want of adequate preservation methods FAO estimates that about one quarter to one third of world food production is susceptible to the attack by pests, insects, bacteria, and fungi which thrive on these foods causing a big dent in the economy of the country. The conventional methods in practice such as decontamination, storage and quarantine treatment using fumigants (ethylene bromide and ethylene oxide) are being reconsidered because of their potential dangers to human health and environment. Mankind also has to face new challenges posed by the contamination of its food supply with pathogens and parasites leading to food borne diseases. A dramatic increase has been observed in food borne diseases since 1945 and today it is the most wide spread health problem not only in third world countries but also in industrialized nations with high hygienic standards. The report of the joint FAO/WHO expert committee on food safety states that "Illness due to contaminated food is the most wide-spread health problem in the contemporary world and an important cause of reduced economic productivity" [WHO Technical Report Series 705/1984]. Besides these, an important source of foreign exchange earnings through the export of food commodities such as poultry, meat and meat products, frozen sea foods, frog legs and spices is lost due to rejection of these by the importing countries on the ground of poor hygienic quality. So, there is an urgent need to evolve a viable technology for preservation of these commodities.

The Way in which Food Irradiation Concept was developed

The concept of using ionizing radiations for food preservation is not a new one. A British patent for use of ionizing radiation to improve the keeping quality was issued about 85 years ago (1905) which stressed the remarkable advantage of irradiation over direct use of chemicals. However, the proposed source, Radium was not easily available for detailed studies.

Meanwhile the use of X-rays for inactivation of *Trichinea* in pork was reported in 1921, by the US Dept. of Agriculture — Bureau of Animal Husbandry. X-ray machines available at that time were not powerful enough for the treatment of food. Efficiency of X-rays to kill larvae, eggs and adults of tobacco beetle and bacteria was also recognised. During 1940s, electron accelerators were developed in Germany and USA and the use of these for sterilization of some food stuffs was reported. In 1951 B.E. Proctor and G.A. Goldblith examined the potency of different radiation sources for utilization as source of ionizing radiation for food preservation. These studies eliminated neutrons, because of induced radioactivity, alpha-particles and UV because of low penetration. The X-ray machines used then did not produce sufficient energy for food treatment. Accelerated electron was found to be the only feasible source. Later on US Atomic Energy Commission worked on nuclide source, ^{60}Co and ^{137}Cs came as prominent sources for food irradiation. Following the identification of effective sources, US Army Natick Laboratories in Natick started intensive research on Food Irradiation. Many countries such as UK, Belgium, Canada, France, Netherlands, Poland, FRG, Soviet Union and India came forward and established similar facilities for studying the technology. Thus about thirty years of intensive research on various aspects of food irradiation established the feasibility of this technology as a viable alternative for food preservation.

Numerous processing methods like sundrying, salting, smoking, which are as old as mankind itself, as well as modern preservation techniques like canning, vacuum drying, pasteurizing, deep freezing are available at present for processing of various food products. A recent addition to these methods is the use of ionizing radiation for preservation which has certain unique applications not provided by other techniques.

Food Irradiation has several advantages

There are many distinct advantages in using irradiation technology over conven-

tional food processing methods. First of all irradiation is a physical process similar to heat treatment or microwave cooking. Being a cold process, changes occurring in the food constituents are very minimal and insignificant when the prescribed dose levels are used. It also permits conservation of fresh agricultural commodities by extending the freshness i.e. good appearance, odour and taste and nutritional quality. By this way it could improve the economy of food production by equitable distribution of produce for extended period. This is an important factor since it can stabilize the prices. It also contributes towards food safety by reducing health risks in foods. Irradiation is considered to be the most effective method to eliminate food borne pathogen in food even in pre-packed condition. It can replace or drastically reduce the use of food additives and fumigants which pose genotoxic and/or occupational health hazard. Through its ability to inhibit sprouting of root crops, to prevent reproduction of insects, to kill food spoilers and to delay the ripening of fruits, irradiation is also a potent method for reducing post harvest losses. It is pertinent to note here that cost of irradiation and the low energy requirement for the process compares favourably with conventional food processing techniques.

How the Irradiation Process is Controlled

The ionizing radiation is capable of converting atoms and molecules into ions by knocking off electrons because they are energy charged particles like electron or photon such as X-rays or gamma rays. All types of ionizing radiations are not recommended for use in food irradiation because some cannot penetrate the food (alpha-particle) or they can make irradiated material radioactive (high energy X-rays or electrons).

The Codex General Standard for irradiated food recommended only three types of sources for use to maintain strict safety features. They are gamma rays from radionuclide ^{60}Co or ^{137}Cs X-rays generated from machine sources operated at or below an energy level of 5 MeV; Electrons generated from machine sources operated at or below an energy level of 10 MeV.

The dose: When ionizing radiation passes through food, some radiation energy is absorbed by the food which is called absorbed dose. The unit of absorbed dose gray (Gy) is equal to absorption of 1 J Kg. Formerly the unit used was rad. 100 rad = 1 Gy. ^{60}Co is not a waste product from nuclear industry but is specially manufactured for use in radiotherapy, sterilization of medical products and irradiation of food. ^{137}Cs fission product contained in used fuel rods needs to be purified in reprocessing plant before its application as a radioactive source. ^{60}Co is the choice of gamma irradiation source. Since it is water insoluble there is no risk of environmental contamination. It is often heard in public debates on food irradiation that gamma irradiation facilities cause health hazard by the accumulation of radioactive waste, but this concept is misplaced since ^{60}Co is converted into nonradioactive nickel.

Stringent steps are taken to avoid accidental radiation exposure to personnel and to ensure clean environment around the irradiation facility. Besides the in-built safety principles, a routine check on the possible radiation emission around the installation is also carried out regularly. The source is composed of pencil shaped sealed capsules of the isotope held by stainless steel rack in plane or plaque configuration. When the facility is not in use, the source is submerged in a pool of water about 8 meter deep. The source is housed in a special chamber with 2 meter thick concrete walls serving as biological shield. These built-in safety measures ensure safe access of workers into irradiation chamber, when the source is in submerged position. During irradiation, a hoist mechanism operated remotely allows the source to raise to a position where it can emit the radiation. The conveyor system is used to automatically transport the food packed in appropriate containers or packages around the source to permit radiation exposure. During this operation entry into the vicinity of irradiator is closed by thick doors which are interlocked with the source hoist mechanism. The entire operation of food irradiation plant is strictly monitored to ensure total safety to the operator and the environment.

Application of Food Irradiation

At the very outset it should be stated that irradiation processing is not catholic, that it can be applied to all types of foods. However, it can be adopted to solve some specific problems in preventing food losses and assure safety and wholesomeness

of foods by itself or complementing other processes. One has to bear in mind that it should not be used to replace good manufacturing practices. Unless the purpose of its application is defined the suitability of irradiation cannot be ascertained. Some of the applications of irradiation are summarised in Table 1. Nevertheless, all food, for instance milk, butter etc. are not amenable for irradiation treatment.

Irradiation obviates the need for spraying chemical sprout inhibitors and also potentially carcinogenic fumigants like ethylene dibromide, ethylene oxide and propylene oxide. Repeated application of fumigants is often necessary for disinfesting grains and spices. Its importance as an efficient method for eradication of fruit fly and mango seed weevil in tropical fruit has been recognised by quarantine authorities. In enhancing hygienic quality, irradiation could reduce the level of microorganisms in fish and meat products giving shelf stable products. Like any other technique irradiation at any stage cannot improve the quality of an already spoiled food. Low dose irradiation cannot eliminate all microorganisms or their toxins. Thus these products need appropriate storage conditions at low temperature. In the case of microbial toxins, e.g., aflatoxin or staphylococcus which cannot be destroyed by irradiation or heat, the susceptible products like maize or shrimps should be ascertained as to their quality, i.e., no toxins are present before taking for irradiation.

BARC Studies

The R & D work done at BARC for the past 25 years has established the efficacy of irradiation process for the preservation of potatoes and onions (inhibition of sprouting), mangoes and bananas (delay in ripening), wheat and wheat products (insect disinfestation), fish, poultry and meat (reduction in spoilage microflora, and extension of shelf life), frozen sea foods (elimination of pathogens like *Salmonella*), spices (insect disinfestation and microbial decontamination). The optimum doses, the minimum and maximum, to achieve the desired effect were worked out. Extensive studies on the physiological and biochemical changes were also undertaken to determine process parameters and also quality assessments of irradiated foods. As a contribution to the International Project in the Field of Food Irradiation, animal feeding studies on irradiated wheat, onions, fish and whole diet were conducted to test the wholesomeness of these foods. The data generated from these studies subsequently

helped the international body, the Joint FAO/IAEA/WHO Expert Committee on Wholesomeness of Irradiated Foods to establish the wholesomeness of foods irradiated at or below 10 KGy.

Irradiated Food is Safe and Wholesome

Radiation processing technology is unique in the sense that no other technology used in food processing has undergone nutritional and toxicological testing to such an exhaustive extent and magnitude. Extensive studies carried out by several laboratories around the world have concluded that irradiated food is hygienic, nutritionally adequate and devoid of any toxic principles. After careful scrutiny of all available data the Joint FAO/IAEA/WHO Expert Committee on the Wholesomeness of Irradiated Foods has recommended in 1980 that irradiation of any commodity upto an overall average dose of 10 KGy. neither presented any toxicological hazard nor introduced any special nutritional or microbiological problem. US FDA, in 1986, accorded clearance for irradiation of any food upto a dose of 1 KGy and recommended a dose of 30 KGy for spices. In May 1990 the US FDA has permitted irradiation of poultry products with a dose of 3 KGy for the control of food borne pathogens. In 1983 the Codex Alimentarius Commission adopted General Standards for irradiated foods and formulated Code of Practice for the Operation of Irradiation Facilities.

It is evident from the voluminous data compiled in a number of laboratories, that irradiation treatment of food upto the prescribed dose levels leaves no residues and the changes if any in the nutritional value (i.e. loss of some vitamins) are comparable with those processed by other methods and during storage. Foods processed under prescribed conditions of irradiation do not in any way become radioactive, a fact most people refuse to comprehend. The fear emanates from the knowledge that irradiation has deleterious effects on living organisms and the mental association with this fact made many to believe incorrectly that irradiated food also would produce some similar effects. Despite the fact that a volume of data accepted by health authorities and scientists familiar with the subject recognized that irradiated food as safe, some people still remain skeptical. According to their notion, exposure to ionizing radiation makes the food unwholesome because radiation is a health hazard. Off and on these critics cite a lone report published in

1975, from the National Institute of Nutrition, Hyderabad, claiming polyploidy in Kwashiorkor children, monkeys and rats. A committee of experts appointed by the Government of India in 1976, after critically examining the techniques adopted in this study has come to the following conclusion:

Opinion of the committee appointed by the Government to scrutinize NIN data: "Much of the data are not only mutually contradictory but also at variance with the established facts of biology. Once these data were corrected for the biases which has given rise to the contradictions, no evidence of increased polyploidy could be observed with the ingestion of freshly irradiated wheat".

The observed numbers of polyploidy in control groups in these experiments are extremely low and number of test subjects was too small to arrive at a statistical conclusion. Further, many laboratories around the world who have tried to repeat these experiments were not successful.

Recent work by Chinese scientists on chemical analysis and animal and human experiments have shown that irradiated foods are safe. The Chinese scientists have carried out well controlled experiments involving human volunteers consuming irradiated food for 7 — 15 week period. There were 17 to 70 test subjects in each experiment and the total number of subjects was 439. Clinical tests conducted in all experiments failed to exhibit any significant differences between control groups and groups consuming irradiated foods. Some of these experiments included freshly irradiated wheat in the diet.

The microbial safety of irradiated food was established after evaluation of the data by the Board of International Committee on Food Microbiology. There were no qualitative differences in the kind of mutation induced by ionizing radiation and that induced by other food processing methods such as heat treatment or vacuum drying. No evidence suggestive of any untoward effect of irradiated food upto 10 KGy is available. This does not mean that foods irradiated higher than the dose level are unsafe, but it indicates that safety has been established at this level or below.

World Status of Food Irradiation

Presently 36 countries have approved one or more food items processed by ionizing radiation for human consumption. A total of 40 items have been approved either unconditionally or on a restrictive basis for human consumption

Table I
Food Irradiation Application

<i>Dose level</i>	<i>Process (dose range)</i>	<i>Commodities</i>
Low	Inhibition of sprouting (0.06-0.15 kGy)	Onions, potatoes, ginger, garlic
	Insect ripening of fruits (0.2-0.75 kGy)	Grains, Citrus fruits, vegetables, spices, dried fish
	Delayed ripening of fruits (0.25-1 kGy)	Mango, banana
Medium	Shelf life extension by destruction of spoilage bacteria (1.0-2.0 kGy)	Fish; poultry, meat, shellfish, strawberry, mushrooms
	Elimination of pathogens (2.0-7.0 kGy)	Eradication of Salmonella in frozen sea foods and chicken.
	Microbial decontamination (10 kGy)	Spices and condiments
High	Sterilization (25-50 kGy)	Blanched red meat, pork, poultry

Table II
Commercial Application of Food Irradiation (as of June 1988)

<i>Food item</i>	<i>Countries</i>	<i>Quantity (Ton/annum)</i>
Spices	Belgium	8-10,000
	France	3000
	Hungary	400
	Netherlands	18000 (Also includes poultry & dehydrated vegetables)
	South Africa	1000 (includes dehydrated vegetables)
	USA	3200
Potato	China	500
	Cuba	500
	Japan	15-20,000
	South Africa	20,000 (includes onions)
Onion	Chile	500
	GDR	5600
	South Africa	20,000 (includes potatoes)
	Thailand	600
Grains	USSR	400,000

(Table II). Test marketing of irradiated foods has been initiated in a number of countries with successful results. Japan, which had suffered the agony of atomic explosion and radiation hazard was the first country to market successfully irradiated potatoes. The Netherlands is another country practising food irradiation for the last five years at a commercial scale. Several thousand tonnes of food items such as frozen prawns, spices, dried vegetables, egg powder etc. are being treated annually by commercially operated irradiation plants. After obtaining the approval of Ministry of Health, USSR sanctioned marketing of irradiated wheat and other cereals on a commercial scale.

Status of Food Irradiation in India: Government of India cleared irradiation processing for treatment of onions, frozen sea foods and spices for export in 1986. The maximum overall dose allowed was 10 KGy. An apex body namely, National Monitoring Agency under Ministry of Health was constituted to define guidelines and to oversee all aspects of using radiation technology for food preservation. An onion irradiator for demonstration purposes is being built at BARC and it is proposed that such irradiators will be installed at the site of crop production. Also, a facility for irradiating spices is proposed to be set up at Cochin during 8th Five Year Plan.

Another major development in the application of this technology is the lifting of the ban on irradiated foods in UK. Irradiation is to be allowed in Britain but its use will be strictly controlled and all foods treated will have to be clearly labelled. This will be done through the Food Bill which was passed by the Parliament in January 1991. ECC countries have also cleared a number of food items for treatment with irradiation and proper legislation are being enacted for using this technology at commercial level.

How Expensive is Food Irradiation?

Economic feasibility of food irradiation is really a genuine consideration for entrepreneurship. Presently about 30 pilot or industrial irradiators in 23 countries are processing foods or food ingredients. However, they are not fully dedicated to food alone, but are primarily engaged in the sterilization of medical products. Currently 500,000 tons of foods per annum is being treated in different countries. By extrapolating the information from these irradiators and from more than 140 industrial irradiators operating, the capital cost of irradiation can be estimated. Initial capital investment for food irradiation

will be high and the economic evaluation should be carefully done taking into account, plant throughput, mode of irradiation (single or multi-purpose), plant utilisation, multiproduct facility and seasonal availability of products, capital and operating cost, selection of isotope source and its availability, presence of legislative framework and consumer acceptability.

The major cost involved is the cost of the source. One can arrive at the actual cost only by determining the specific requirements like annual through-put, loading system, package sizes, and radiation doses. The replenishment of radionuclide source is a major operating cost. Others include labour cost, cost of maintenance, utility, and manpower required etc. Gamma irradiation will be more flexible than electron or X-ray sources, which require heavy investments. The cost of irradiating a specific food product is arrived at by dividing monthly operating costs by monthly through-put. These figures will certainly vary from installation to installation. However, many comparative studies have indicated that the total cost of irradiation is low (1-5%) in comparison with the wholesale cost of same foods. The cost for spice irradiation in India works out to be Rs. 0.4 to Rs. 1.2 per Kg depending on the annual throughput and product.

Acceptance and Trade in Irradiated Foods

Food irradiation is widely accepted by world bodies like FAO, WHO, IAEA, and major nations as an alternate technology for post harvest preservation of food stuffs. However, its acceptance by consumers, industry and trade is rather slow. This is one of the main constraints in introducing food irradiation in domestic or international trade. Besides consumers, many influential sections of the society like politicians, medical professionals and intelligentsia are insufficiently informed with the result that they are unable to make a balanced view of the merits and demerits of this process.

Add to this is the well orchestrated propaganda by the antinuclear activists which appear often in the press influencing the common man. Therefore, a need exists for organising carefully designed and executed programmes of information dissemination and public education, directed towards consumers in general and industrial users, traders, medical and public health community, scientists, the press and other media, regulatory authorities and legislators in particular. In these publicity programmes, apart from reas-

suring that irradiated foods are safe, nutritious and hygienic, one should stress the potential benefits of the process such as improvement of public health, replacement of chemicals in food preservation and prevention of food losses and the economic gain to the nation.

Major objections raised by the consumer organisations against food irradiation are the absence of detection methods for irradiated foods and a lack of regulatory measures to prevent the misuse of this technology. While a search for a simple, rapid detection method is being pursued vigorously, Governments are urged to give assurance that the process will always be controlled and regulated by forming proper legislations. The disharmony existing in the legislation from different nations may constitute a barrier for international trade. Presently the clearance of irradiated foods in various countries are on a case by case basis, because of the importance to the national economy and to meet the requirements for their own producers and processors. The separate clearance for the same food — for example — the dose applied, existing in different countries may be a hindrance to international trade. Harmonization of label standards on an international basis would facilitate label printing for internationally traded goods and promote lower costs for irradiated products. Uniform labelling of irradiated products would assist consumer education and also promote understanding of the nature of irradiated product along the channel of distribution.

The consensus of Geneva meeting: The International Conference on the "Acceptance, Control of, and Trade in Irradiated Foods" in Geneva, 1988, has recommended that "Regulatory control by competent authorities is a necessary prerequisite for introduction of the process in accordance with the principles of Codex General Standard for Irradiated Foods and Recommended Code of Practice for the Operation of Radiation Facilities used for treatment of food. Food irradiation is not to be used as a substitute for GMPs". The Geneva meeting also recognized that "international trade in irradiated food would be facilitated by harmonization of national procedure based on internationally recognized standards of the control of food irradiation".

The general lack of a concerted approach by industry to regulatory authorities to permit the use of irradiation for treatment of foods was also a significant constraint in the development of this technology. The magnitude of overall

economic risk factor, was considered to be the main reason for the apparent lack of pressure by the majority of food and irradiation processing companies. There is concern over the question of public acceptance, aggravated in many cases by the anticipated need to label irradiated food. There is also evidence of actual

resistance to food irradiation from companies heavily committed to "traditional methods" of food preservation. In view of the recent clearances and necessity for application of this technology, among the food products which currently benefit from irradiation for international trade are, fruits for quarantine purposes and

spices for decontamination. With the implementation of the recommendation of the Geneva meeting, it is hoped that the international trade in irradiated food will flourish in coming years. Thus it can be stated that food irradiation is a safe and sound technology which would boost our hygiene and economy.

(Reprinted from Nuclear India, Vol.27/9/91)

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RAW MATERIALS

119 Genetically engineered tomato

Calgene (Davis, Calif.) the agricultural biotechnology company in USA, has acquired exclusive North American rights from Campbell Soup to a genetically engineered gene to be used in fresh tomatoes. Calgene developed an antisense polygalacturonase gene. The 'FlavrSavr' gene reduces levels of 24 enzyme isolated from tomatoes, polygalacturonase - which causes pectin degradation and fruit softening - by blocking its production.

The tomatoes are reported to have longer shelf lives, enhanced resistance to post-harvest disease and superior handling characteristics for shipping after vine ripening. Campbell has rights to use the gene in tomatoes grown for processing into sauce, juice, and tomato paste.

Calgene received a US patent in February 1989 covering the use of antisense technology in genetically engineered plants. Having conducted field trials, the company is planning to grow, pack and distribute 'FlavrSavr' tomatoes.

(Chemical Weekly 37(25), 1992, 95)

120 Organically grown foods

Organically grown foods have made a debut in USA and other advanced countries in recent years. This is due to increased awareness in educated consumers for natural foods grown without the use of man-made pesticides or fertilisers. Consumers in affluent educated countries desire more fresh or fresh-like products that are virtually appealing, full-flavoured, nutritious, convenient to prepare and serve, and pesticide-free at a reasonable price.

There is as yet no evidence that organically grown food or pesticide-free foods are superior in quality or nutrient content to conventionally grown foods or that they are more healthy than the conventionally produced foods. Organically grown foods may be significantly more expensive, available in less variety than conventionally grown foods, and may present some health risks if fertilised with improperly treated compost or fresh, untreated animal manure.

A justification for the purchase of organically grown foods cannot be made as yet on the basis of any superiority in nutrition, taste or freedom from pesticides.

(*Food Technology* 44(12), 1990, 123-130)

121 Toxin-free kesari dal

Scientists at the Indian Agricultural Research Institute (New Delhi) have succeeded in eliminating toxins from the notorious Kesari dal, saving the way for the evolution of high-yielding varieties of this pulse safe for human consumption. This has been achieved by employing the latest techniques in plant genetic engineering.

The cultivation of Kesari dal (Lathyrus sativus) has been banned in India because of the presence of neurotoxins in its grains which causes paralysis of the lower limbs. Kesari dal otherwise is very hardy plant and can withstand drought as well as floods. Most of the available types of this pulse has a toxin content as high as 0.6 to 1%.

(*Chemical Weekly* 37(24), 1992, 101)

STORAGE AND INFESTATION CONTROL

122 Enzyme controls starch aging in food products

A Japanese researcher has discovered a microorganism that produces an enzyme called b-amylase which is easily absorbed by raw starch and which could be used to control starch aging in food products.

The microorganism is a strain of B-subtillis. The enzyme will decompose raw starch to glucose in small amounts. Thus, in the food production process, sugar addition for aging control will not be necessary.

Aging of food products is prevalent in high water content foods like rice products. For reducing difficulties in starch aging, the addition of sugar to starch pastes in the food production process or the addition of b-amylase from soybeans is popular in noodle and confectionary factories.

However a search for alternative processing methods has been under way. Common amylases could not decompose raw starch, but the enzyme can.

When 200 grams of raw starch was suspended in water with 0.5 ml of the enzyme, 80 per cent of the enzyme absorbed starch, and 0.4 per cent of the starch was decomposed by the enzyme.

From the experimental results so far, food manufacturers could look forward to processing of raw starch products without heat in the preparation stage and uniform products with the use of the enzyme.

(P.T.I. Science Service 11(2), 1992, 14)

123 A liquid nitrogen system to extend shelf-life of packaged foods

A British company has developed an innovative system that can improve the quality and shelf-life of many foods by putting droplets of liquid nitrogen into their packaging on the production line.

The London-based BOC Company has found that each droplet vaporises almost instantaneously, and as nitrogen expands almost 200-times in changing from a liquid to a gas, it gives a large dilution effect and rapidly displaces most of the air originally in the food pack to create a controlled atmosphere that will not support life or most microbial action.

The first droplet dispenser machine is being used to package mixed fruit and nut products and extend their shelf-life. The technique is also especially suitable for packaging coffee, potato crisps, peanuts (in which oxidation can cause skinning or colour change), and milk products - the flavour and odour of which can be affected by oxidation.

The system is adjustable from a liquid nitrogen volume of 0.003 ml per cycle to 100 ml/cycle. The BOC machine can dispense, stop and restart in response to programmable timer settings and sensing devices that coordinate it with the product packaging rate, upto line speeds of 80 packs a minute. A gas/liquid phase separator ensures that pure, high quality nitrogen, which is odourless, tasteless and inert with food, is supplied.

(Chemical Weekly 37(17), 1991, 104)

124 Apples, gently grown apples

Apple trees come into contact with roughly 1,000 species of insects. But wait, do not run for your sprayer-500 to 700 of these harmless, while 300 do good. Only 120 species are potential pests, of which only 10 are of any economic significance and only five occur in any one location.

So, these days, a lot of German farmers go around with a magnifying glass, a cotton funnel and a cane, instead of the usual sprayer. With this new apparatus, they collect the different varieties of pests from apple trees and examine them. And the more varieties they see, the more they are reassured, because many of these feed on others. Then knowing which harmful pests they are up against, they buy only those preparations that are specifically meant for them. And not all of what is eventually sprayed are poisonous chemicals. Some merely interrupt the reproduction cycle of a given pest; some make its larvae immobile.

To encourage this "integrated" approach to fruits cultivation and pest control, the CMA - German agriculture's central marketing board-awards its quality seal only to those apples that are grown in this way. Not just that, even multinational companies like Bayer and Hoechst are researching and selling "gentle pest control preparations". As a result, 75 per cent of this season's apple crop from commercial growers in Germany will have used this gentle, natural method.

(Business India 6-19 January 1992, 14)

FOOD ADDITIVES

125 New natural antibacterial food additive

A Japanese company Nippon Oils and Fats Co. Ltd, has recently developed an anti-bacterial food additive from an extract of thick-stemmed bamboo species as the main component. Being a natural anti-bacterial food additive, it will satisfy the demand for natural food additives. It can be most favourably compared in anti-bacterial effect with synthetic chemical additives.

The new additive is produced by shaving away the green epidermis of the bamboo called Moo Soo Chiku to obtain an alcoholic extract. To this alcoholic extract glycerol and glyceric fatty acid ester added. The researchers have shown that the active component in the extract is 2,6-dimethoxyl-parabenzquinone which shows a powerful effect especially on putrefactive thermoduric bacteria present in the soil.

The food additive 3% in a gravimetric ratio is diluted by 1,000% before being applied to cut vegetable. The tests showed that the number of bacteria on these cut vegetables is 1/200 that of bacteria on the same type of vegetables to which no food additive is applied. Further, the former

vegetables are superior in thermal stability to the latter when both are kept at 10°C for 4 days. The new additive is already marketed in Japan at 3,700 yens per kg.

(Chemical Weekly 37(17), 1991, 105)

126 Review shows artificial sweeteners don't increase hunger

Although commercial non-sugar sweeteners might help dieters, some research has indicated that these sweeteners may increase hunger after using them. Do diet soft drinks and sugarless gum actually make you eat more?

The results of various studies give no clear-cut answers, but in a review of the research done on artificial sweeteners, Barbara Rolls, associate professor of psychiatry at Johns Hopkins, shows that they have never been found to increase food intake. Research done by Rolls indicates that non-sugar sweeteners increased neither hunger nor food intake and that they can be useful in dieting.

In the April issue of the American Journal of Clinical Nutrition, Rolls reviews the controversy over artificial sweeteners from 1986, when it was first reported that aspartame may increase appetite.

"In both short-term and long-term studies, the consumption of artificially sweetened foods or drinks either caused no change in eating habits or reduced the amount of calories eaten," Rolls says.

Despite the findings that indicated that aspartame increased ratings of hunger, both the work done by Rolls and her review of the literature conclude that these sweeteners may not be the answer to weight control, but they allow the consumption of palatable foods that otherwise would have been avoided.

(Food Production / Management June 1991, 16)

127 A new non-frozen version of simplese (fat substitute)

A new version of Simplese, a fat substitute approved by FDA last year for use as a thickener or texturizer in frozen dessert only, will soon be used for all food categories, including cheese spreads, mayonnaise, and baked goods, the manufacturers announced.

The new non-frozen version of Simplese, manufactured by NutraSweet Company is subsidiary of whey protein concentrates that can withstand the higher temperature needed for baking. Whey protein concentrate is an ingredient on FDA's 'generally recognised as safe' (GRAS) list.

FDA has informed the manufacturer that it has no objection to the marketing of the whey ingredient as a fat substitute so long as it complies with FDA's regulation for whey protein concentrate and the source of the protein is identified on the label of the product in which it is used.

Both the original and this year's versions of Simplesse are made by blending and heating in a process called micro-particulation. In this process, the protein is shaped into microscopic round particles that roll easily over one another, creating the feel of a creamy liquid with the texture of fat.
(*Chemical Weekly* 37(25), 1992, 104)

128 A novel fat substitute developed

A.E. Staley, which was taken over by Tate & Lyle, USA, in 1988, has developed a new substitute for fat and has christened it 'Stellar'. It is a modified starch with potential applications from salad dressings to baked goods. The company is likely to have commercial quantities of Stellar by 1992.

Stellar has been under development for 2-3 years. It has been made from corn-starch powder. The powder is treated with hydrochloric acid to cleave the molecules. The crystalline powder so obtained is 'sheered' with water to produce a creamy paste with fat-like properties. Tate & Lyle has applied for patents on the process as well as the product.

Stellar can replace 60-80 per cent of fat in many applications such as margarine, sour cream and ice cream. The product can also be used in baked goods and it is superior in this regard to Monsanto's product, Simplesse.

It is believed that world market for fat substitutes is of the order of \$ 1000 million each year, and with increasing weight-consciousness worldwide this market will go up. According to Tate and Lyle there will be a little breathing time for the new product because Stellar meets the existing regulations on modified starches and approval from the US Food and Drug Administration will not be required. In Europe, Stellar will be launched by the Belgian subsidiary, Amylum - a firm that already produces a number of modified starches.

(*Journal of Scientific and Industrial Research* 50(9), 1991, 639)

PROCESSES

129 A new microencapsulation technology

In USA M-Cap Technologies International (a division of Du Pont Wilmington, Delaware have introduced a new microencapsulation technology for flavour used in foods and pharmaceuticals.

M-Cap recently acquired exclusive worldwide rights for a new patented microencapsulation technology. It uses a device called 'M-Cap a machine that produces microcapsules without leaving oil residues on the outer walls of the capsules. M-Cap also uses 'beta technology'. It alters the crystalline structure of the capsule wall from a random pattern consisting of both alpha and beta forms to the more stable linear beta form. For example, M- Cap alters hydrogenated vegetable oil using beta technology and uses this modified product as its encapsulation shell.

The molecules in the capsule wall are aligned with one another as opposed to other methods in which the molecules are arranged in a more jumbled manner. The beta process enables M-Cap to produce capsules which are more stable and better able to contain volatile flavours. In contrast to spray drying methods, M-Cap technology employs pressure pulse instead of high temperature used in spray drying methods.

(Chemical Weekly 37(27), 1992, 112)

130 Cytolase - Fruit processing enzyme

Cytolase is a new proprietary enzyme developed by researchers at Genencor International (USA) for the fruit processing industry. It is generally recognised as safe (GRAS) formulation derived from selected strains of Aspergillus niger and Trichoderma longibrachiatum. The new enzyme has both pectinase and cellulase activities.

When applied to fruit mash prior to separation of pomace and juice, the enzyme breaks down the juice bearing structures, causing liquefaction or maceration of the fruit and thereby allowing for the flow of juice. Compared with existing products the enzymes reportedly increase juice yields and decreases the need for pectinase in juice clarification.

(Chemical Weekly 37(21), 1992, 105)

131 A new technology for carrageenan

Grinsted Products Brabrand, Denmark has recently unveiled a new improved proprietary technology for producing Carrageenan from red algae. Grinsted is one of the biggest producers of Carrageenan from red algae worldwide. Its new plant for Carrageenan will be located in Chile, the main source of red algae.

The new proprietary technology is reported to produce significant savings in initial expenses and operating expenses compared to traditional alcohol extraction production methods. However, the company is not willing to reveal more details on its proprietary process.

Grinsted estimates the world market for Carrageenan at 25,000 tonnes/year. Carrageenan has traditionally been used in milk products like ice cream and puddings, but is finding increasing applications in meats like turkey and hamburgers in USA. Recently, Carrageenan has been facing competition from Philippines natural gum, a non-extracted sea-weed product that can replace Carrageenan in many applications at significant cost savings.

(Chemical Weekly 37(26), 1992, 103)

132 Capolac - a milk derived calcium product

A Danish company called Denmark Protein has recognised the growing awareness of calcium for the prevention of chronic diseases like osteoporosis and has therefore recently launched a new milk derived calcium product. The product is sold under the trade name Capolac. Capolac contains 50 per cent of calcium phosphate and is wholly derived from milk by physical means only, thereby making it an ideal calcium supplement in most foods and beverages. Producers of dairy products like for instance yoghurt, now have the possibility of calcium-fortifying their products with an all natural calcium product.

(Chemical Weekly 37(22), 1992, 109)

133 Developments in butter fat spreads technology

Radical changes are on the horizon in the yellow butterfat spreads as current trends towards fat reduction and new formulations continue. Increased softness or lower refrigerator temperatures has long been an objective, using techniques such as blending summer and winter butters, milk fat fractionation, gas incorporation; improved control at the churning process and mechanical working. Results so far have only been moderately successful. Butter has also been granulated for convenience (e.g. using malto dextrins).

Nutritionally, milk fat can be interesterified with oleic acid and linoleic acids, using specific enzymes, but flavour will be impaired. Somewhat similar fats may be made by feeding protected oils to the herd. Using supercritical carbon dioxide extraction, cholesterol levels in butter may be reduced. Reduced fat butter (40% fat) is now commercially available in UK and USA, but efforts are required to restore the full flavour impact of butter itself in such products.

As developments become more sophisticated and the characteristics of 80% fat traditional products are retained in lower fat variants, spreads with fat contents in the range about 5-60% or so will probably become the norm, to the exclusion of higher fat products. Enhanced positive nutrition can be expected in terms of the inclusion of selected fatty acids (for health fitness benefits). Water continuous spreads may well come to occupy a significant market niche. Some such fat substitute blends can be anticipated in the near future in USA.

(Chemical Weekly 37(21), 1992, 112-113)

134 Low cholesterol egg products

Australia now leads the world in the technology to remove cholesterol from eggs. The Australian Stodak process is cheaper and more efficient than other comparable processes. It removes cholesterol without altering any of the egg's natural qualities.

The Fresher Egg Group of Australia has signed an agreement with CSIRO to develop the low cholesterol egg technology. The Fresher Egg Group with National Egg Products, is planning to market a full range of low cholesterol egg products, to be called 'Low Chol Egg', initially for commercial use and for supermarket shelves in about a year or two.

This development has arisen from the CSIRO discovery, of a means of selectively extracting cholesterol from egg and dairy products by an adsorption process, from the deregulation of the egg industry in New South Wales, and from the Federal Government's policy of encouraging Australian commercialisation of CSIRO research.

The new process will boost Australia's exports. The Fresher Group has a processing plant that meets the strongest requirements of the US Dept of Agriculture.

For further information contact: Mr. Francis Pace, Pace Farms, David Oakenfull, CSIRO Division of Food Processing.
(*Chemical Weekly* 37(18), 1992, 112)

135 Long-lived flavour - retaining chewing gum

Researchers Anita Yung-Chu and Joseph Robinson have recently been granted a US Patent 4,992,280 (Official Gazette, Feb 12 1991) for a technique to make chewing gum retain flavour for several hours while being chewed. The inventors assigned the patent to Colombia Laboratories (Hollywood, Fla). Gum flavours normally dissipate after about 10 minutes of chewing.

The patent describes a continuous film of polymer, such as polyvinyl acetate, with flavourants dispersed in it. The rate of release of flavourant is controlled by the polymer used. The technique also can be used to administer pharmaceuticals, like nicotine.

(*Chemical Weekly* 37(18), 1992, 111)

136 Soyadal - a new high protein pulse

Scientists in New Delhi have developed a new high protein pulse made from soyabean called soyadal which they say could become a tasty and cheap source of protein.

The soyadal, developed by scientists at the Ganesh Scientific Research Foundation, contains 35 per cent high quality protein. The protein content of common dals is said to be between 22 and 25 per cent.

According to GSRF, the preparation of soyadal or high protein dal from defatted soya flour could help popularise the nutritious soyabean in India where pulses are a major sources of protein and contribute to 10 per cent of foodgrain consumption.

Protein quality as well as the quantity in soyapulse will be very high since amino acid distribution of soybean is close to that recommended by the Food and Agricultural Organisation for maximum protein utilisation.

Soyadal gives 340 to 350 calories per 100 gm which is almost the same as common dals. It is also attractive in taste and its cooking performance is similar to other dals. According to GSRF, the new soyadal can be made available at Rs 10 per kg while the average price of other common dals is roughly Rs. 16 per kg.

(*P.T.I. Science Service* 11(1), 1992, 3)

137 Processing rice bran by supercritical fluid (SCF) extraction

SCF processing has become an exciting and emerging technology for the food industry abroad. Today because of increasing concern about the health effects and environmental impact of conventional solvents and consumer demand for new improved, more natural, high quality products, supercritical fluids processes are beginning to find widespread use in such commercial applications as coffee and tea decaffeination and the extraction of a variety of flavours, fragrances and colourants from plant material.

Recently SCF processing has been applied to the extraction of rice bran oil. This extraction produced a low-fat rice bran, while maintaining original texture and without leaving toxic residues and eliminate utilisation of expensive, dangerous and environmentally objectionable solvents.

Supercritical carbon dioxide offers the advantages of being non-toxic and easily removed from the extracted oil. Rice bran oil is recovered during the supercritical process by reducing the pressure to atmosphere, which causes the dissolved oil to precipitate out of the supercritical fluid (SCF). In addition, the use of SCF processing offers the added advantage that the quality of the extracted rice bran oil can be influenced (with reference to its sterol content) by varying the parameters of the extraction process. Thus, the rice bran oil produced from SCF processing is a more natural, high quality oil.

Not only is the SCF process rice bran oil of a more natural and higher quality, but the defatted rice bran is also superior in quality to that from both hexane extraction and expeller pressed. The residue from an expeller press is a wet, gummy cake which must go through a drying step before it can be put to use and that from a hexane extraction must be carefully treated to ensure all residual hexane is removed.

On the other hand, the rice bran residue from a carbon dioxide SCF process maintains its original structural integrity and texture and does not require dyeing or any further treatment since carbon dioxide is non-toxic, non-inflammable and non-corrosive. It can, therefore, be incorporated into baked goods, cereals, health foods, flaked or ground to a desired texture.

In addition, the defatted rice bran maintains its nutritional value, dietary fibre content and protein structure because the hot organic solvents that occur in the conventional processes are avoided due to operation at close to ambient temperatures and the absence of abrasive forces in the carbon dioxide SCF process.

Although the SCF process requires high pressures equipment, which in turn means a high initial capital investment, the cost could be significantly reduced in future on a large scale with efficient engineering design.

The high quality and more natural rice bran products, along with the high valued sterol end products could make the SCF process more feasible for commercial applications in the near future.
(*Chemical Weekly* 37(27), 1992, 113)

138 Soya fortified biscuits

The Soyabean Processing and Utilisation (SPU) project at the Central Institute of Agriculture Engineering (CIAE) has developed soya fortified biscuits, which have a great potential for combating malnutrition and are particularly suitable for diabetes.

One hundred grams of soya fortified biscuits which contain 12 gms of protein, 24 gms of fat and 500 calories have 50% more protein than ordinary biscuits, reports Dr. Gandhi, senior scientist at SPU. Further, it has been claimed that its rich protein calorie content could help check malnutrition among children. Further, soyabean containing 40% of good quality protein, 22% carbohydrates, 20% cholesterol free oil, minerals and vitamins is one of the most suitable food ingredients for diabetes. According to Dr. Gandhi, a low carbohydrate and high protein and fat diet is prescribed by the medical profession for the control of diabetes.

(*Chemical Weekly* 37(22), 1992, 109)

BY-PRODUCTS AND WASTE UTILIZATION

139 A beverage from whey

Dairy technologists at the Andhra Pradesh Agricultural University in Hyderabad have developed a beverage from whey, the watery portion that separates out when milk is coagulated.

The scientists have standardised the procedure for making the beverage which not only quenches thirst but also provides 15 per cent carbohydrates, 0.25 per cent minerals and 0.1 per cent fat.

Whey production in the country is estimated at 75 million litres. It is also obtained as a byproduct during preparation of sweets, cheese, paneer and channa.

Whey contains nearly half the nutrients of the original milk. It is also rich in calcium and Vitamin B₁₂.

Describing the preparation of the beverage, the scientists said whey should be mixed with 0.2 per cent citric acid and 10 per cent sugar before boiling it for 30 minutes.

This boiled concentrate should be left undisturbed at room temperature overnight to allow the precipitated proteins to settle down. The clear solution should be decanted and the volume lost during boiling made up by adding water. Orange essence or paste mixed at the rate of 1.5 ml per litre of liquid whey gives flavour to the drink.

The beverage thus prepared can be stored for at least three months.
(*P.T.I. Science Service 10(24), 1991, 2*)

140 Novel biopolymer

A Novel biodegradable polymer is being produced from lactic acid and is now close to commercialisation by a US-based company, Ecochem.

The polymer known as polylactide is made from renewable resources such as cheese, whey and corn. They degrade into water and carbon dioxide in the presence of moisture, air and common bacteria.

The company is initially targeting uses in packaging products made of paper. The polymer can be used as a coating or to formulate inks and adhesives. When the pack is recycled, the polylactide can be dissolved, taking with it any printing ink and adhesives.

This has potential uses in the fast food industry and in grocery products, in applications such as insulated drink cups, fast food container or frozen food packages. Trials of recyclability of packaging have proved very promising.

A pilot plant is likely to start in late 1991. Polylactide is likely to be marketed to paper, printing and packaging industries by 1994.
(*Deccan Herald 20 January 1992, VI*)

141 Novel uses of chitosan

Nonwoven materials made from wood pulp, glass or plastic fibres coated with the polymer chitosan could be used in a variety of future applications, and help clean up the beaches.

Chitosan is made from the shell waste of shrimps and crabs. This waste currently plagues some coastal areas in the US, especially near seafood processing plants. Now, a group of scientists at the University of Washington, Seattle, say they have found uses for chitosan.

The studies suggest that paper sheets made from chitosan-coated wood-pulp fibres have a much higher wet strength than noncoated fibres. Besides paper and packaging uses, chitosan-treated materials could be used in bandages and in pollution filters. It is claimed that these filters could remove heavy metals from waste streams. Since chitosan-coated fibres, readily react with formaldehyde, they might find use in laboratory face masks and as furnace filters.

The use in bandages is even more attractive, the researchers claim. Tests indicate that chitosan in bandages can increase the rate at which wounds heal. Some researchers believe the human enzyme lysozyme breaks down chitosan into products that stimulate the body to produce agents toxic to pathogens.

(Tech Monitor Nov-Dec 1991, 11)

142 Sugarcane waste yields energy

The Uttar Pradesh Government has launched a programme for producing an alternate source of energy from sugarcane waste in sugar mills. Many cooperative sugar mills have shown keen interest in implementing the scheme. An energy producing plant is being installed at the Sheh Road Sugar Mill in Bijnor. It will produce six MW of power from the sugarcane waste. This is the first project of its kind in the country. The mill has made a contract with the State Electricity Board to provide the electricity to the grid. The new technique adopted in the new project will reduce fuel consumption from 58 to 50 per cent and in some mills up to 42.32 per cent.

(Chemical Products Finder Annual 1991, 361)

PROCESSED PRODUCTS

143 Tetley introduces pouch tea

Tetley, Inc. has introduced its new Tetley Private Estate Filter Pouch Tea, which is designed specifically to brew large quantities of delicious iced tea in the new three-gallon brewers, the company said.

Tetley, Shelton, CT., said the pouch is convenient because it needs no filter, that it is clean, because there are no loose tea leaves, and that it is premeasured to ensure consistent taste, brew after brew.
(*World Coffee and Tea* November 1991, 18)

EQUIPMENT AND MACHINERY

144 Electronic manometer

An Indian company is offering electronic manometers with solid state sensors.

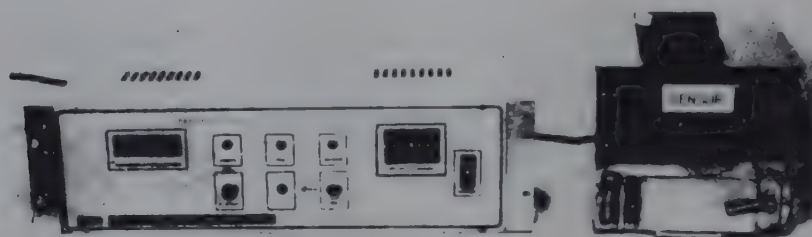
According to the company, Innovative Instruments, the electronic manometer is suitable for measuring differential fluid pressure in food processing industries, and can replace 'U' tube and inclined tube manometers. It has a rugged metallic body with an epoxy powder coating. It is compact, light-weight, and can be mounted in any position.

The sensor establishes indirect contact with the fluid to be measured. Results are displayed on a digital display. The firm has been exporting to Malaysia, Sri Lanka and Africa.

For further information, contact: Innovative Instruments, 125, Mahajan Society, Fatehganj, Baroda 390 002.
(*Economic and Commercial News* 22(3), 1992, 12)

145 Microprocessor based digital moisture meter

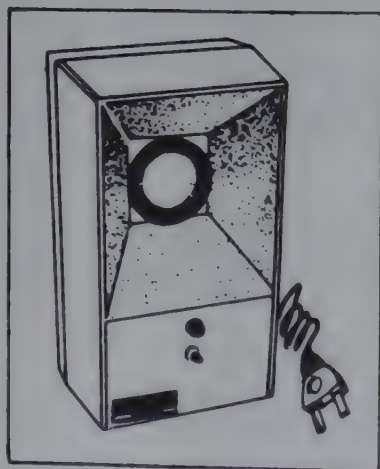
PIE has introduced a Microprocessor Based Digital Moisture Meter to measure the moisture content of various types of solid and liquid materials. Cumbersome routine tuning the drift problems have been totally eliminated. The general purpose design adapts to almost all types of materials. Measurement is achieved to an accuracy of better than 0.1%. The instrument is immune to variations in environmental conditions and is user-friendly. Uses are in industries like pharmaceutical, chemical, food and oil.



For more details write to: Pioneer Industrial Enterprises, 104, NHCS Layout, III Stage, 4th Block, West of Chord Road, Basaveshwar Nagar, Bangalore, Karnataka 560 079.

(*Chemical Products Finder* 10(8), 1992, 113)

146 Sonic and ultrasonic electronic pest/birds repeller



The Telecare is an electronic device producing high frequency ultrasonic sound waves between 20 to 25 kilohertz approximately. This sound is inaudible to human ears but intolerable and damaging to the nervous systems of pest and cause fear, discomfort and anxiety by a hostile environment. It works on 230 volts AC. Also available is DC operated model on car battery for outside use. It is useful to repel pest as rats, lizards, bats, insects, spiders, cockroaches, mosquitoes and other flying insects. It can be installed in homes, offices, shops, godowns, hotels, hospitals, computer rooms, restaurants, and food, pharmaceutical and textile industries.

For more details write to: Telecare Electronics, Sumeru Complex; Opp Sadhana School, Near Paldi Char Rasta, Ahmedabad, Gujarat 380 006.

(*Chemical Products Finder* 10(8), 1992, 26)

147 New solar cooker

Until now three solar cooking technologies - the hot box type cooker or solar oven, the unpressurised direct solar steam cooker without storage facilities and the focusing dish mirror - have been developed. But none of these despite heavy promotional efforts including subsidies, have found wide acceptance since they do not strictly cater to the peculiar culinary habits of society. For instance, they did not provide for frying facilities.

The solar steam cooker with storage developed by Swedish company Axwell AB claims to overcome these drawbacks and is aimed at developing countries. The design incorporates the pattern of the traditional (African) stove except that the fuel is replaced by solar energy. Thus it is cone-shaped and equipped with a chimney.

The steam generated flows from the collector to the heat storage unit through the natural ventilation created by the upward pull of the chimney. By overheating, steam temperatures of 350-400°C are possible. The system offers direct cooking facilities simply by diverting the steam from the heat storage facility to the cooking pot.

The overheated steam increases the number of applications of the oven. A hospital can use for sterilisation; it can be converted into kinetic energy and used to power a water pump. Another possible application is a hot-air engine to generate electricity or the stored heat can be transmitted towards a flat piece of sheet metal that serves as a hot-plate.

(Business World 12-25 February 1992, 17)

148 A simple and effective fish scaler

In some fish processing operations (eg. salting and smoking) it is convenient to remove the fish scales, which is usually done with the blunt side of a knife. However, very often, due to the type of fish scales, the fish skin or the geometry of the fish this is not easy and the skin can be damaged. In such cases it is recommended to construct and use the fish scaler shown in Figure 1.

The base (1) should be constructed of clean hard wood; if food- grade plastic resin is available, it is advisable to paint the wood base with it before finishing construction.

The active elements in the scaler are the mineral water or beer bottle caps (2), an almost universally available material. The caps should be

Figure 1: Fish Scaler

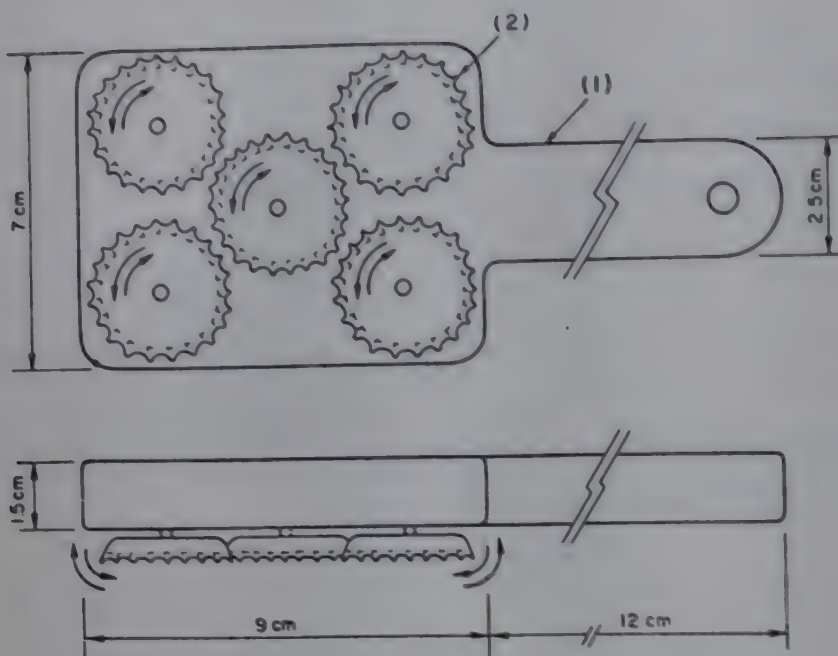
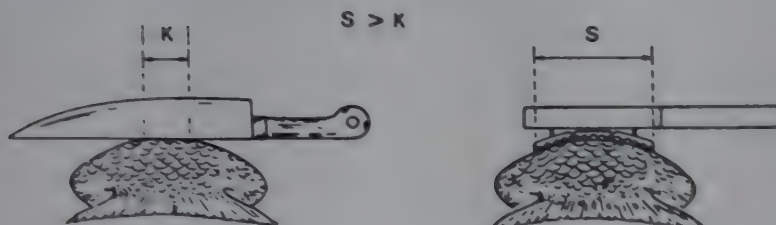


Figure 2: Sections Covered by the Knife and the Scaler During Normal Operation



fish. Thus it takes less time to scale the same type of fish with the scaler than with the knife. Further, the scaler applies shear and torsion forces to the scales, and not only shear force as with the knife. This makes the action of scaling easier and less damaging.

The scaler, as any other fish processing tool, should be cleaned thoroughly after use with clean water (preferably chlorinated water or soap) and a brush. When chlorinated water or an appropriate cleaning agent is not available, the scaler can be cleaned with saturated brine and a brush.

Scalers can be designed and constructed following other cap distributions (eg two or three caps in line, three caps in triangles, etc) in order to adapt the scaler to special types of fish. The scaler has proved to be useful in other

stripped of any paper, plastic or rubber seal, and cleaned (no sticking material should remain on its surface). The caps are nailed such that they can move loosely around the nail.

The scaler is used like any other scaler (or knife). The fish is held firmly by the tail on a flat surface, and the scaler is moved from the tail to the fish head with firm but gentle movements (the scaler should not be moved in the opposite direction).

This scaler has an advantage over the knife as can be seen in Figure 2. The scaling section of the scaler is usually bigger than that of the knife, since the caps can pivot on the nails and follow the shape of the

applications such as the elimination of small feathers from chickens. Use of the same scaler for poultry and fish should never be permitted as it may cross-contaminate fish with hazardous bacteria, mainly Salmonella spp. which is often present on poultry.

This scaler was developed during the FAO/DANIDA Training Project on Fish Technology and has been successfully utilized with various types of fish.
(*Fish Tech News* 11(1), 1991, 6)

149 Dryers for dehydration of grapes and other food products

Gayatri Industrial Engineers has developed dryers for dehydration of grapes and other food products. The dryer consists of hot air circulation fans, a heating system with steam/electric/oil heaters, an exhaust arrangement and a glass- wool insulated oven. The air flow system gives uniform temperature throughout the drying zone. Designed to give high efficiency drying with minimum losses, the dryer replaces conventional sun-drying process by greatly reducing the time for dehydration.

For more details write to: Gayatri Industrial Engineers, A3/002, Govardhan Nagar, LBS Marg, Mulund (W), Bombay 400 080.
(*Chemical Products Finder* 10(7), 1991, 43)

150 Double planetary mixer-kneader

Fabdecon Double Planetary Mixer-Kneader is a well engineered, heavy duty vertical mixer-kneader. Key to the mixer's exceptional operating efficiency is the combination of the strirrer design, its rotation and flexibility of the change-can features. The mixer-kneader has no packing glands or bearings in the product zone, therefore, cleaning problems between batches are virtually eliminated and contamination free batches can be produced consistently time after time. The mixer-kneader can be built with MS, SS-304, or SS-316 as material of construction for contact parts. The mixer-kneader can be designed for simple mixing operations to sophisticated reactions involving high temperature, vacuum or internal pressure. Application areas include: food, chemical, plastic coatings, and similar industries.

For further information write to: Fabdecon Engineers, 138, Damji Shamji Indl Complex, Off Mahakali Caves Road, Andheri (E), Bombay 400 093.
(*Industrial Products Finder Annual* 1991, 113)

151 Dense phase conveyors for milk powder

Scorpio Engineering offers dense phase conveyors for granulated and agglomerated powders used in the food industry (coffee and milk powder). The conveyors transport the material gently. This does not affect the solubility of the materials in liquids like milk, water, etc. The system supplied conveys 4.5 tonnes of milk powder over 100 metres distance. The material is directly transported from storage silo to packing section. The dual pulse air knife dense phase pneumatic conveying system for granules do not break during pneumatic transport.

For more details write to: Scorpio Engineering Pvt Ltd., 132 Wheeler Road, Cox Town, Bangalore 560 005.

(Chemical Products Finder February 1992, 85)

152 Rotary spice dispenser

Solbern, Division of Howden Food Equipment, Inc. recently introduced the new Rotary Spice Dispenser.

The Solbern Spice Dispenser is designed to quickly, easily and accurately dispense spices and other granular products in small quantities into either glass or metal containers.

It is designed to be easily installed into your existing conveyor lines and has variable speed controls to quickly adjust to your line speed. It also includes climate control capabilities, enabling you to run hygroscopic products in moist and humid conditions.

The rapid clean out feature allows a quick change over from one product to another. The dispenser also features interchangeable filling cups for a quickly adjustable wide volume range.

(Food Production / Management May 1991, 16)

153 Wrapping machines for biscuits

Khosla Engineers offer three types of machines for wrapping biscuits in EWS (envelope fold) style. Long seal can be made on belly or side (depending on the model). Many useful options are available with these machines. They are: print registration, no- packet no-wrap interlock, automatic infeed of biscuits, device for smaller length of inner wrapper, and BOPP as inner

wrapper. A recently introduced model is specifically designed to use BOPP to wrap naked biscuits in envelope type of folding. A unique feature of this machine is that it makes a folded fin seal on long seam for perfect integrity.

For further information write to: Khosla Engineers, 644 Sector 16-D, Chandigarh 160 015.

(Industrial Products Finder Annual 1991, 464)

154 Plastic disposable container making machine

Wonderpack Industries manufactures plastic disposable container making machines incorporating pre-cut disk feeding that brings down wastage to minimum. The machine is suitable for manufacture of tea/coffee glasses, ice cream cups and a variety of other containers for packing processed foods. It can also be used for production of lip bending containers. It facilitates use of HIP, PVC, ABS and PP upto 2 mm thickness. The machine, with a production capacity of over 1,200 containers per hour, is suitable for use as a profitable small-scale project and for actual users (manufacturers of processed foods products). The machine does not generate wastage, eliminating the need for recycling of scrap at producer's end. It does not involve punching operation in that pre-cut disk (from sheets) of desired sizes are supplied. Containers are formed by pressure and plug assisted forming technique. Optional photo sensor counts the number of pieces actually produced. The machine has magazine for disks and auto stacker for finished products. No human touch is involved in production as each individually formed container is automatically ejected.

For more details write to: Wonderpack Industries Pvt Ltd, 72 Shivali Mansion, 1st Floor, Lamington Road, Near Bombay Central Station, Bombay 400 008.

(Chemical Products Finder 10(8), 1992, 76)

155 Edible bio-packing

The Franz Haas machine line-up now offers machines for the production of bio-packing made from vegetable based raw materials. The world's largest waffle producer has evolved a versatile packing material as a substitute for paper and plastic. The Haas packing field of use ranges from inserts for chocolate boxes through fruit trays to containers for hamburgers, hitherto mostly of polystyrene. The latest addition is the edible yoghurt container. The container is made of corn or wheat starch, weighs only 5 g and contains hardly any calories for the benefit of conscientious weight watchers. The container's interior is a water-resistant, neutral flavoured and edible lining

which corresponds to most of the European food laws. Apart from being fully biodegradable, the new eco-friendly packing can be produced with a minimum of energy and pollution by any food processing firm.

For more details write to: Franz Haas Waffelmaschinen Industrie GmbH, R&D, Haasstrasse, A-2100, Leobendorf, Austria.
(*Chemical Products Finder Annual, 1991, 316*)

156 Bulk liquid packaging system

ITC is now introducing Wunder-Pac Bag-in-Box, a bulk liquid packaging system, jointly with Liqui-Box Corporation, USA. It is ideal for packaging edible oils and vanaspati, processed fruit pulps and juices, beverage syrups, dairy products, wines etc. Wunder-Pac consists of a tough multiply collapsible bag fitted with a tap and housed within a rigid outer container which can be a box, a crate, or a drum. These can accommodate as little as 3 litres or as much as 200 litres. The tap provides a convenient way of dispensing the product. The system offers advantages which conventional packaging cannot match - improved filling accuracy, reduced leakers, size flexibility, better display value and a totally unadulterated product, because the packaging is highly tamper-evident. The bags and boxes come in a collapsed form, so transportation costs are reduced and warehouse savings can be as high as 80%.

For more details write to: ITC Ltd, Packaging and Printing Division, P.O. Box 2277, Tiruvottiyur, Madras 600 019.
(*Chemical Products Finder Annual 1991, 328*)

157 Packaging machinery for liquid

PSE offers a range of fully automatic packaging machinery for liquid. The range includes automatic filling machine (volumetric), bottle filling machine, BOPP cap sealing machine, inspection table, turn-table, and gumming and labelling machine. Also offered are sterile filtration equipment, distilled water still, pressure vessel, rubber bung washing machine, sterile filling vessel, filtration unit, vial sealing machine, vial filling machine, sterility test unit, filtration unit, bottle washing machine, storage tanks, and bottle sealing machine.

For more details write to: Pharmaceutical and Surgical Equipments, Zilla Wadi, Suren Road, Andheri (East), Bombay 400 093.
(*Chemical Products finder Annual 1991, 217*)

158 Automatic pouch making machine

Model PM-200 is a fully automatic machine capable of producing pillow type pouches out of heat sealable laminates such as polyester + poly, BOPP + poly, paper + poly, etc., used for packaging tea, spices, confectionery, and snacks. Input material in the form of reel is loaded on the machine and threaded through various stations of the machine. The machine automatically performs all the operations such as drawing, folding, centre sealing, bottom sealing, and cutting and deposits the finished pouches on the output tray at the rate of 50 to 100 pouches per minute depending upon the pouch sizes and working materials. This machine can produce pouches of 75 mm to 300 mm in length and 75 mm to 200 mm in width. Machines for pouches of other sizes can be supplied on request. The PM-200 is equipped with two photocell controllers, one for controlling bottom sealing and cutting on registration mark and the other for controlling the alignment of the two edges of the centre seal. This feature of photocell controllers along with the precision temperature controllers for the sealing jaws make the machine capable of producing pouches of absolute uniformity with no rejection or scrap. This machine is also equipped with a controller which automatically stops the motor and emits a warning signal with no input material to run. The machine is built with heavy CI frame, precision machined components and anti-friction bearings. Electronic controllers are built with solid state components and integrated circuits. As the machine consumes no compressed air, the actual running cost is very low, only 2.2 kW power (22/440 V AC) is required to run it. This machine weighs about 350 kg and requires 3.5 m x 1.5 m floor space.

For further information write to: Creative Industrial Manufacturing Co,
156/A/69 B T Road, Calcutta 700 035.
(*Industrial Products Finder* 20(4), 1992, 28)

159 Food machinery oil

Tribol offers food machinery oil with high performance lubricating characteristics in three types of viscosity for a broad range of food machinery applications. The Molub-Alloy 823 FM grease and special high temperature grease Molub-Alloy 9830 are approved for applications where incidental food contact may be possible. Molub-Alloy 9830 can also be used as sliding safety agent in oxygen installation. These lubricants with antiwear- properties can provide longer continuous trouble-free service in brewery bakery, cannery, dairy, beverage and other food industry applications.

For more details write to: Tribol GmbH, Erkelenzer StraBe 20, D(W)-4050 Monchengladbach 5, Germany.
(*Chemical Products Finder February 1992, 34*)

160 Robots at the ready with faster food

Just as robots already assemble a lot of the world's cars, soon they may also make a lot of the world's hamburgers. A European patent application reveals that six engineers have been working secretly at McDonald's "campus" in Oak Brook, Illinois, on a fully automated cooking system. The system has already been tested in several stores in the US, and one in Munich.

"Food preparation is labour intensive", explains the patent, "and the labour cost is a large portion of the total cost of prepared food". Fast-food restaurants sometimes have difficulty in recruiting sufficient staff. When customer demand fluctuates the restaurant ends up being sometimes overstaffed and at other times understaffed. Unused food goes stale and has to be thrown away.

McDonald's engineering department in Oak Brook decided to tackle the problem with "a food preparation device that can be operated by a robot".

The robot stands behind the stoves, moving sideways on tracks between the grill, griddle and frying pan. The robot also has access to dispensers of uncooked food. Its arms have tools at the end which allow it to grab raw hamburgers, slap them on the grill, then grab hamburger buns and warm them, while cooking French fries in boiling fat.

When the robot judges that the food is cooked, it dumps it into a holding bay ready for sale to customers. Everything is under computer control. The restaurant staff punch in orders and information on how many customers are waiting and the robot grabs and cooks as much food as the computer thinks the customers will need.

Parts of the system have already been tested in six McDonald's in Colorado, Mississippi, Indiana, Minnesota, California and Munich. But most tests involved only a French fries fryer, not the full hamburger cooking machine. McDonald's has also been working with Coca-Cola on a fully automated soft drinks dispenser to go with the fryer. In the second quarter of this year, all McDonald's in the US will be offered the opportunity to install robot fryers and drinks dispensers. European restaurants will get the chance next year.

The full system is ready to use now but the technology remains on the shelf. Its inventor, John Reinertsen, says McDonald's is waiting for "the right cost benefit". It is still cheaper to employ humans than install the multi-talented robot.

(New Scientist 1 February 1992, 28)

PACKAGING

161 Leak-proof beverage caps

Leak-proof beverage caps with wide applications in beer, soft drink and edible oil bottles have been introduced for the first time in India by Larsen & Toubro Limited (L&T). Designated Freshtops, the beverage caps completely seal the product from atmospheric contamination, preventing loss of fizz in soft drinks flatness in beer and rancidity in edible oils. The high viscosity plastisol increases resilience and ensures effective sealing of the bottle from the top as well as the sides.

Other advantages of Freshtops are that they can be opened with a single twist, leaving no sharp edges; they dispense with problems linked with closures using separate liners, e.g. poor adhesion, dust and dirt; trouble-free performance at high-speed filling and sealing.

In case of edible oil, sealing with Freshtop dispenses with the need for adding anti-oxidants or refining the product - the only other ways of retarding but not preventing rancidity.

Freshtops are made of aluminium alloy of carefully selected composition, gauge and temper. Tests at successive stages of manufacture ensure that every cap in each batch conforms to high design standards.

For further details, contact: Larsen & Toubro Limited, Packaging Division, Powai Works, Saki Vihar Road, Bombay 400 072.

(Economic and Commercial News 22(1), 1992, 13)

ANALYSIS

162 HPLC sample processor

The AS3000 is designed for microliter sample preparation and injection into a high performance liquid chromatograph. The automated preparation can reduce solvent waste, eliminate handling of toxic solvents, increase sample throughput, and improve accuracy and precision. The unit includes a built-in, patented vortex mixer/heater that opens opportunities for automation of new procedures. It features 120-sample vial capacity and injection reproducibilities of better than 0.5%. (SOURCE = (Science 21 February 1992, 1009)

163 Millet fermentation removes phytic acid

Pearl millet (Pennisetum typhoideum) is a staple food for many people in Asia and Africa. The grain, however, contains considerable amount of phytic acid and polyphenols, both of which are anti-nutrients, particularly for mineral availability. Researchers M. Kheterpaul and R. Chauhan have recently shown that natural fermentation at 20°, 25° and 30°C for 72 hours brings about a significant reduction in the phytic acid content in pearl millet flour.

At 30°C, the phytate is almost eliminated although a rise in the polyphenol content is seen. Not only does the fermentation decrease the phytate content but starch and protein digestibility is improved, the best being at 30°C.

(*Chemical Weekly* 37(25), 1992, 104)

PRODUCTION (Raw Materials)

164All-India final estimate of food grains, 1990-1991

Production in '000 tonnes							
State	Rice	Jowar	Bajra	Ragi	Wheat	Maize	Barley
Andhra Pradesh	9,808.3	904.4	170.1	194.5	10.0	715.4	-
Arunachal Pradesh	142.5	-	-	-	6.7	45.7	-
Assam	3,270.2	-	-	-	104.8	12.9	-
Bihar	6,553.0	2.2	4.8	88.2	3,539.8	1,058.0	51.0
Goa	145.0	-	-	3.8	-	-	-
Gujarat	791.1	379.0	1,024.6	25.4	1,443.7	529.8	-
Haryana	1,853.0	64.0	525.0	-	6,440.0	49.0	107.0
Himachal Pradesh	106.5	-	-	4.1	601.7	655.0	43.1
Jammu & Kashmir	549.2	-	7.9	-	262.2	446.7	6.2
Karnataka	2,417.5	1,335.8	204.6	1,039.9	90.3	617.0	-
Kerala	1,086.6	2.1	-	1.5	-	-	-
Madhya Pradesh	5,954.1	1,555.3	153.1	4.7	5,550.3	1,256.0	121.8
Maharashtra	2,313.7	5,948.0	1,114.3	213.8	918.7	134.7	2.0
Manipur	274.2	-	-	-	-	11.4	-

CONTD.

STATE	Rice	Jowar	Bajra	Ragi	Wheat	Maize	Barley
Meghalaya	119.8	-	-	-	5.9	22.0	-
Mizoram	63.8	-	-	-	-	11.1	-
Nagaland	156.3	-	-	-	-	22.3	-
Orissa	5,275.3	20.8	5.6	216.5	59.0	176.1	-
Punjab	6,535.0	0.3	12.0	-	12,155.0	236.0	102.0
Rajasthan	141.5	515.1	2,516.4	-	4,308.5	1,299.1	438.0
Sikkim	23.5	-	-	6.4	21.6	60.0	2.9
Tamil Nadu	5,761.7	650.0	313.1	321.3	0.1	37.4	-
Tripura	501.3	-	-	-	6.9	-	-
Uttar Pradesh	10,195.0	493.0	850.9	194.2	18,355.5	1,495.5	754.6
West Bengal	10,436.4	0.4	0.3	10.9	530.2	81.6	11.6
Andaman & Nicobar	30.6	-	-	-	-	-	-
Islands							
Dadra & Nagar Haveli	18.4	0.6	-	3.6	0.3	-	-
Delhi	1.8	6.7	2.7	-	110.9	-	1.4
Daman & Diu	6.2	-	0.4	-	-	-	-
Pondicherry	57.3	-	1.2	1.2	-	-	-
All-India	74,588.8	11,877.7	6,907.0	2,330.0	54,522.1	9,072.7	1,641.6

(Directorate of Economics and Statistics No.F.No.8-6/90-91- AS(E)-ES, January 1992)

165All-India final estimate of pulses, 1990-91

(Production '000 tonnes)

State	Gram	Tur	Black gram	Green gram	Horse gram	Lentil	Peas	Khesari	Moth-bean	Other pulses
Andhra Pradesh	58.5	78.0	377.4	142.6	53.1	-	-	-	-	7.0
Assam	1.5	4.9	-	-	-	-	-	-	-	42.1
Bihar	158.0	82.0	62.8	125.1	39.0	167.7	27.4	240.2	-	15.2
Gujarat	115.8	352.4	63.5	55.3	-	-	-	-	16.5	23.1
Haryana	469.0	49.6	0.3	5.0	-	9.6	2.5	-	0.2	0.1
Himachal Pradesh	2.2	0.2	4.5	-	1.1	-	-	-	-	5.5
Jammu & Kashmir	0.5	-	5.5	4.8	0.8	0.2	3.6	-	6.1	2.4
Karnataka	67.8	180.4	17.7	88.2	158.1	-	-	-	-	37.8
Kerala	-	0.2	1.4	1.0	11.2	-	4.3	-	-	0.7
Madhya Pradesh	1,737.0	433.1	184.1	52.9	47.8	163.3	44.5	235.4	-	3.6
Maharashtra	357.8	420.9	199.1	311.1	67.5	3.2	2.0	14.2	36.0	32.1
Meghalaya	0.3	0.7	-	-	-	-	-	-	-	1.4
Mizoram	-	-	-	-	-	-	-	-	-	1.7
Nagaland	-	-	-	-	-	-	-	-	-	10.9
Orissa	32.9	123.7	290.8	306.4	208.0	-	8.0	-	-	92.2
Punjab	45.2	11.2	3.3	37.5	-	6.4	4.2	-	0.6	-
Rajasthan	1,014.2	25.2	55.2	130.7	-	12.4	15.8	-	405.7	63.1
Sikkim	-	-	6.4	-	-	-	-	-	-	10.0
Tamil Nadu	4.7	73.4	146.8	53.5	50.7	-	-	-	-	22.2
Tripura	0.4	0.6	1.1	1.1	-	0.4	0.6	-	-	2.1
Uttar Pradesh	1,114.8	591.9	105.5	46.0	-	418.1	481.0	-	0.4	-
West Bengal	15.0	2.9	101.2	9.4	4.2	53.2	3.1	29.1	-	0.9
Andaman & Nicobar Islands	-	-	-	-	-	-	-	-	-	0.8
Dadra & Nagar Haveli	0.2	1.2	1.3	-	-	-	-	-	-	0.5
Delhi	0.4	0.3	-	-	-	-	-	-	-	0.4
Pondicherry	-	-	1.7	1.6	-	-	-	-	-	0.2

(Directorate of Economics and Statistics No.F.No. 8-6/90-91- AS(E)-ES, January 1992)

166 Area, production and yield of coconut in India and Kerala

Year	All-India			Kerala		
	Area (['] 000 ha)	Production (million nuts)	Yield (nuts/ha)	Area (['] 000 ha)	Production (million nuts)	Yield (nuts/ha)
1987-88	1346.0	7269.9	5401	775.4	3346.0	4315
1988-89	1425.5	8541.4	5993	816.9	4215.0	5160
1989-90	1509.5	9283.4	6148	875.9	4394.0	5016

(*Indian Coconut Journal January 1992, 5*)

PRODUCTION (Industrial)**167 Sugar production**

Sugar production during December was 20.67 lakh tonnes against 18.33 lakh tonnes during the corresponding period last year, according to the Indian Sugar Mills Association (ISMA).

This brings the total output of the season 1991-92 to 33.23 lakh tonnes against 30.69 lakh tonnes during last year.

The total sugar despatches from factories during the month of December stood at 9.12 lakh tonnes for internal consumption and 55,000 tonnes for exports against 8.67 lakh tonnes (including 15,000 tonnes of imported sugar) for internal consumption and nil tonnes for exports during the same month last season.

The total offtake during December 1991-92 was 28.95 lakh tonnes for internal consumption and 1,05,000 tonnes for exports against 25.54 lakh tonnes (including 35,000 tonnes of imported sugar) for internal consumption and nil for exports during the corresponding period last season.

(*Financial Express 4 February 1992, 12*)

168 An update on India's vegetable oil production

India's vegetable oil production is rising with a concomitant decrease in vegetable oil imports to the lowest point in ten years. Domestic oil production is expected to be above 4.7 million tonnes for 1990-91 and for 1991-92. Vegetable oil imports for 1990-91 are forecast at 256,000 tonnes, with a rise to 341,000 tonnes forecast for 1991-92. By dramatically limiting imports and letting the domestic price of vegetable oil rise to roughly three times its value

in world trade, the government has created conditions which may make India self-sufficient in vegetable oil, albeit at a very low level of domestic consumption.

Annual per capita consumption is expected to fall to 5.9 kg for 1990-91, compared to 6.0/kg in the previous period. Wealthier segment of the population may average more than 15 kg per year of vegetable oil consumption with the poorer portions consuming less than 1 kg annually. Vanaspati production relies more than previously on domestic oils. Five years ago, total vanaspati production was about 916,000 tonnes, with more than half the oil used being of foreign origin. For 1989-90, vanaspati production is estimated at 880,839 but using only 52,000 tonnes of imported oil. Oil imports have been reduced partially due to lack of foreign exchange. (*Chemical Weekly* 37(24), 1992, 104)

169 Estimated production of coconut oil in India

(lakh tonnes)	
Year	Production
1987-88	2.24
1988-89	3.14
1989-90	3.36

(*Indian Coconut Journal* January 1992, 4)

170 Tea production in India

The tea harvest in 1990 proved to be a record for India, as the crop came in at 717,000 metric tons. But India gave up its position as the world's largest exporter, to Sri Lanka, according to the USDA.

India's shipments of tea were estimated at nearly 200,000 tons in 1990, down from 1989's total of 220,690 tons, the USDA reported. Export earnings, however, increased in 1990 to 10.28 billion rupees, compared with 1989 revenues of 8.40 billion rupees. The USDA reported that the government is planning to issue export licenses this year for 220,000 tons, with expectations of 215,000 tons actually being shipped. About half of India's tea exports are to the Soviet Union, with other major buyers being the United Kingdom, Iran and Egypt.

On the domestic front, India's consumption increased to about 500,000 tons in 1990.

"Instant tea consumption in India is negligible, while the general preference is for CTC teas, which provide more cuppage than orthodox tea," the USDA reported. "India's tea consumption is expanding at an annual rate of over four per cent, with about 70 per cent sold in bulk form and the remainder in packets, which are traded mostly in urban areas. Increased consumption of soft drinks, fruit juices and ready-to-mix concentrates have made significant inroads into the urban beverage market, but tea still remains the most popular drink, except in some areas of South India, where coffee is preferred".

The overwhelming popularity of tea, however, has caused some problems for the Indian industry. At a recent meeting of the Tea Research Association, chairman V.K. Goenka said that the difference between demand and supply will widen if changes aren't made in the production portfolio.

"The hard fact today is that the galloping rate of internal consumption, which is more than four per cent per annum, cannot be sustained by the current growth rate of productivity, which stands at around 2.5 per cent per annum," said Goenka. "If the need for increasing exports is added to this gap between demand and supply, both in the national and international contexts, would increase further."

(World Coffee and Tea October 1991, 14-15)

171 World tea production

Region and Country	(1,000 metric tons)		
	1988	1989	1990
Asia and Oceania:			
Bangladesh	43.6	38.4	45.1
China	545.0	535.0	530.0
India	701.1	684.1	717.0
Indonesia	129.3	151.2	155.0
Iran	55.6	56.0	55.0
Japan	89.8	90.5	90.0
Malaysia	4.9	5.2	5.3
Papua New Guinea	9.0	9.0	9.0
Sri Lanka	228.2	208.0	233.2
Taiwan	23.6	22.1	23.0
Turkey	153.2	136.0	140.0
USSR	118.0	125.0	125.0
Vietnam	38.0	39.0	40.0

Contd.

Region and Country	1988	1989	1990
Africa:			
Burundi ^a	3.8	3.9	4.0
Cameroon	2.9	3.0	3.0
Kenya	164.0	186.8	197.0
Malawi	40.2	39.5	39.1
Mauritius	6.9	5.5	5.8
Mozambique	1.5	1.8	1.8
Rwanda	12.3	13.0	13.5
South Africa	11.8	12.7	13.0
Tanzania	14.6	17.0	19.8
Uganda	3.3	4.6	6.6
Zaire	3.1	3.5	3.5
Zimbabwe	16.6	17.9	17.1
South America:			
Argentina	45.0	45.0	45.0
Brazil	14.3	14.8	15.0
Ecuador	1.0	1.2	1.2
Peru	3.0	3.0	3.0
Grand Total	2,483.6	2,472.7	2,556.0

(World Coffee and Tea October 1991, 12)

EXPORT

172 Growth in marine exports

The exports of marine products recorded an all-time high of 171,989 tonnes valued at Rs. 1,365.68 crore during 1991-92, marking a 23.36 per cent increase in terms of quantity and a spectacular 52.87 per cent in terms of value over those in the previous year.

Shrimp continued to be the largest single item of exports. The other items of exports included squid, cuttlefish, octopus and lobsters. The release said that the growth rate in exports measured in US dollars worked out to 10.75 per cent which was noteworthy for the reason that in the major markets of Japan, United States and to a limited extent the European Economic Community (EC), recessionary trends had posed serious marketing problems. (Deccan Herald 10 April 1992, 14)

173 Beef export banned

The Government has banned export of beef and import of tallow, fat and/or oils rendered or otherwise of any animal origin.

According to the new Export Import Policy (1992-97) announced by the Minister of State for Commerce, Mr. P. Chidambaram, besides beef, six categories of items have been placed in the negative list of exports: all forms of wildlife including their parts and products, exotic birds, all items of wild flora included in appendix 1 of the Convention of International Trade in Endangered Species, human skeletons, tallow, fat and/or oils of any animal origin excluding fish oil, and wood and wood products in the form of logs, timber, stumps, roots, barks, chips, powder, flakes, dust.

The items in the negative but prohibited list of imports included animal rennet and ivory unmanufactured.

However, export of cattle, camel and donkeys, among others can be made subject to licensing.

(The Hindu 2 April 1992, 7)

174 Export prospects of soybean to Thai

The Indian exports of soyabean and its substitutes to Thailand is expected to pick up considerably as the Thailand government has sanctioned controlled imports of 80,000 tonnes over a specified period of time. The decision comes in the wake of a bad harvest which may be good news to the soya growers and edible oil industry in India.

Oil cakes and solid residues exports to Thailand have grown from six million bahts in 1986 to 698 million bahts in 1990. The figure for January-September 1991 was 544 million bahts which is a marginal increase of 1.6 per cent over the corresponding period last year.

(Financial Express 24 March 1992, 12)

175 Chillies export earnings

Cardamom, the queen of spices and pepper, the black gold among spices have been pushed far behind by chillies, the hottest among spices, both in terms of quantity and value in exports from the country during the current financial year, according to the Spices Board Chairman, Mr. T. Nandakumar.

He told UNI here that the country had exported 28,250 tonnes of chillies worth Rs. 78.29 crores during the 11 months of the current financial year up to February 92, earning an average unit value of Rs. 27.71 per kg against 20,059 tonnes worth Rs. 23.06 crores during the same period of the previous year.

The average unit value realised then was only Rs. 11.50 per kg, he said.

Mr. Nandakumar said Sri Lanka and Bangladesh were the largest bulk importers of chillies from India this year followed by the US, Mexico and West Asian countries.

If the crop yield improved in China next year, India would not be able to sustain the present international market demand because of the highly competitive price China was able to offer in the world market, he added.

(Financial Express 30 March 1992, 8)

176 Food exports to Germany

India's processed food and other food exports such as rice have good marketing possibilities in Germany and in the emerging democracies of Eastern Europe, according to participants from India in the international "green week" which concluded in Berlin on Sunday.

The participants in the nine-day fair expressed the view that the country will be able to make up its lost market for processed food as a result of the disintegration of the Soviet Union by pushing up the sales in the former East Germany and also in the former East Bloc countries.

The response from trade visitors and consumers from the five new German states and also from Eastern Europe for Indian products was quite encouraging, said Mr R.P. Gautam, Deputy Director of the Agricultural and Processed Food Products Export Development Authority (APEDA), who coordinated India's participation.

(Financial Express 27 January 1992, 1)

177 Cashew kernel exports decline

Cashew kernel exports fell by 23 per cent to 35,669 tonnes during January-November 1991 due to reduced availability of raw cashewnuts for processing, the Cashew Export Promotion Council said.

However, export earnings during the same period jumped 10.69 per cent due to higher unit export price realisation, apparently as a result of the devaluation of the rupee in July last year.

The exports brought in Rs. 439.83 crores compared to the Rs. 397.35 crores during the same period the previous year.

The average unit export price during the period was Rs. 123.30 per kg. an increase of 43.94 per cent over the previous year's Rs. 85.66 per kg, the council said.

Exports to Hong Kong, Germany, New Zealand and the UAE declined by 57 per cent during the period the council said, adding that the former Soviet Union and Czechoslovakia had also brought less of the commodity.

On the other hand the US, with 11,778 tonnes, accounted for 33 per cent of the total exports, showing a three-fold growth over the previous year. Exports to Japan stood at 3,716 tonnes, Australia 1,842 tonnes and Britain 1,197 tonnes, showing an appreciation of 10, five and 3.4 per cent respectively.

(Financial Express 26 February 1992, 13)

178 Indonesia bans meat imports from India

The Indonesian Government announced a ban on import of meat from India on grounds that it could affect the health of its people.

The Minister of Information, Mr. Harmoko told newsmen in Jakarta after a special Cabinet meeting chaired by President Soeharto that the Government had confiscated around eight tonnes of imported Indian meat which did not pass health inspection.

Mr Harmoko said Indonesia had over the past five months imported meat from India for consumers in Bantam, an Indonesian island near Singapore currently being developed into an industrial and tourist center. Imports were estimated at 20 tonnes every month.

According to reports received here from Jakarta, Mr. Harmoko quoted the President as advising people in Bantam to be more careful in future when they imported meat since food items which did not pass the health test could endanger the lives of consumers.

(Financial Express 6 February 1992, 16)

IMPORT**179 Import of palm oil**

India will be importing about 12,000 tonnes of palm oil, being bought in the open market from Malaysia for February shipment.

An estimated two to three lakh tonnes of palm oil was imported from both Indonesia and Malaysia during last year. The exact quantity of import was yet to be compiled, according to official sources here.

India was likely to import less palm oil this year as there was improvement in the domestic oil production.

Meanwhile, the prices of palm oil are expected to stay above \$ 345 (900 Malaysian dollar) per tonne for all of January as the market compensates for the fall in supply, according to a local market report.

(Financial Express 10 January 1992, 2)

180 Import of spices into EEC and India's share

Commodity	Qty. in Tonnes			
	1981		1990	
	Imported by EEC	India's contribution	Imported by EEC	India's contribution
Pepper	31890	984	43841	3950
Capsicum/Chillies	23200	25	28026	1123
Cardamom	544	51	563	45
Ginger	4810	431	8471	289
Turmeric	2700	2416	3427	3087
Seed Spices	18622	703	21792	846
Curry powder	1862	1145	2173	1919
Cinnamon, Clove	11981	-	13180	79
Nutmeg & Mace				
Vanilla	552	-	422	-
Saffron	20	-	27	6
Other spices*	7690	180	3853	254

*Includes Bayleaves, Thyme and spice mixtures.

(Spice India 5(1), 1992, 14)

181 No move to ban MSG import

The Government has no proposal to ban the import and use of monosodium glutamate (MSG) in India but proposes to prescribe a declaration to the effect that it is unfit for use by infants below the age of 12 months. Health and Family Minister, Mr M.L. Fotedar told the Rajya Sabha.

Mr Fotedar told Mr. B.K. Hari Prasad that Nestle's India Limited was not adding MSG to noodles. However, they were using MSG in soups marketed under brand name "Maggi" within the prescribed limit under label declaration.

(Deccan Herald 19 March 1992, 13)

TRADE INFORMATION**182 New innovation in dairy products**

In the affluent EC countries, the sales of dairy products like whole milk butter is dropping in recent years due to greater health consciousness and ageing population. Therefore several European dairy product manufacturers such as the Yoplait company, (a member of Sodial Group) of France has become truly international by developing several innovations.

These European companies attempt to present milk in a form that will compete with soft drinks. But this has only had a limited success. In the yogurt sector, the innovations include, the introduction of drinking yogurt under various brand names; the launch of low fat and artificially sweetened 'light' products and the development of Bifidus and enriched yogurts.

Within two years after their appearance, Bifidus products represent a market of nearly 100,000 tonnes in France alone. Bifidus products appeal to health conscious segment of the population, as this type of yogurt acts positively on the intestinal tract and helps towards achieving a normal healthy intestinal flora. In this age of antibiotic and other potent drugs, the intestinal flora is often disturbed after intake of antibiotics and other potent drugs.

Bifidus yogurt also tastes milder and less acidic. Bio-enriched yogurt represents another innovation in this area. For example, Yoplait's bio-enriched yogurt (marketed under a trade name Yoplus live) is enriched with magnesium, iron, vitamins and fibre.

The E.C. countries are great producers of cheese. Cheese consumption is still rising in these countries, despite the high fat content. But to provide a hedge against future drop in demand, several dairy producers are developing low fat cheese under various proprietary brand names. The consumption of traditional cheese is largely static, with the most of the growth coming from soft, speciality or low-fat cheese sectors. Cheese substitutes have also come on the market, particularly in USA, where they currently, have an estimated 8% market share. This trend is most likely to follow in Western Europe.
(*Chemical Weekly* 37(26), 1992, 110)

183 Centre accepts NDDB proposal on oil blending

The Centre has accepted the National Dairy Development Board (NDDB) proposal to include of imported oils and refined mustard oils in the permitted list of oils for blending, according to Dr V. Kurien, Chairman, NDDB.

Speaking on the occasion of inauguration of the Rs. 2-crore Lok Dhara oil packaging station, he said that this station was the offshoot of NDDB's two-year old proposal on blending which the government now had acceded to. The existing capacity of this station at 50,000 litres in one litre packs per month will be doubled in the next three months, and it was country's first Lok Dhara oil packaging station, he added. More such stations were being set up, he informed.

Lok Dhara is a blended oil which contains two-thirds palmolein and one-third groundnut oil. Even after blending, it retains the nutty flavour of pure groundnut oil. It is aimed at protecting consumers who buy loose adulterated oil, often mixed with non-edible oils, at the price of preferred oils.

Dr. Kurien disclosed that an oil grid will be set up for linking storage tanks located in different parts of the country. "We are creating 10 oil farms, and a sum of Rs. 110 crores is spent on setting up storage tanks and stations", he said.

He said NDDB had yet to secure permission from Agmark authorities which was vital for selling Lok Dhara in the open market. He hoped to get Agmark approval within the next 20 days.
(*Financial Express* 7 March 1992, 10)

184 Industrial alcohol delicensed

The Government has delicensed industrial alcohol. A press note (no. 2 of 1992 series) was issued.

According to the note, the delicensing will give a fillip to production of industrial alcohol which in turn will help in growth of development of downstream alcohol based industries. In addition, delicensing would improve the viability of sugar units as they are allowed to diversify into production of industrial alcohol.

Under the new industrial policy while government delicensed several industries, production of industrial alcohol required compulsory licensing. Government is convinced that industrial alcohol is not a hazardous chemical in the "accepted sense of the term".

Accordingly, industrial alcohol mentioned under item No.22.07 and 29.05 on the ITC system has been deleted from generic entry No.15-Hazardous chemical of annexure-II to the Press Note dated August second, 1991.
(*Economic Times* 15 February 1992, 1)

185 Why microwave cooking fails the taste test

Does food cooked in a microwave oven taste as good as food cooked in a conventional oven? No, it does not, according to two American chemists. Helen Yeo and Takayuki Shibamoto of the University of California say microwave irradiation does not provide the right conditions for the chemical reactions which help a full flavour to develop.

The key to much of the flavour of conventionally cooked food is a sequence of chemical events called the Maillard reaction. This is a complex reaction between sugar molecules and the amino (-NH₂) groups of proteins. It results in the browning or "caramelisation" of the sugars, and is what gives bread a brown crust, for example.

During the Maillard reaction, ring compounds such as thiazoles, furans and pyrazines are produced. These are responsible for flavours we recognise as meaty, caramel-like and nutty. But other ring compounds, such as thiophenes, pyrroles and oxazoles make food taste "off". These have burnt, pungent or fishy flavours.

Yeo and Shibamoto compiled evidence from our comparative studies of the flavour compounds produced in bread and cakes, meat and vegetables cooked

by both conventional and microwave methods. They also compared the effect of these two cooking methods on model "Maillard systems", which mimic what happens in food during cooking. The researchers concluded that flavours produced by microwave are chemically different to those produced by conventional thermal cooking.

In the first of the four studies, microwaved cakes had fewer volatile flavour compounds, and people who tasted them confirmed that they lacked nutty and caramel-type flavours, while they possessed "green vegetable" flavours instead. White bread that had been microwaved lacked caramelisation, although for rye breads there was no difference. For beef, time and temperature were important. With equal cooking times, microwaved beef produced more volatiles. But in a more realistic comparison, microwaved beef had only a third as many volatiles as beef cooked conventionally to an equivalent degree of "doneness". Apparently, a microwave oven does not give the flavour enough time to develop.

Vegetables cooked in water were more complex to study, for bread, cakes and meat, surface drying is a necessary part of the development of flavour. Yeo and Shibamoto point out that some water is needed for the absorption of microwave energy, but too much takes longer to heat. From taste tests, cabbage microwaved wet had fewer volatiles, particularly alcohols, than boiled cabbage.

More "off" flavours were also produced in Maillard systems by microwave cooking. Yeo and Shibamoto suggest that cooking times are too short and temperatures too low in microwave cooking to bring about the Maillard reaction, and that the mechanism which produces the flavour compounds in the two heating methods is different. They found that reducing acidity and increasing the concentration of electrolytes - salts such as sodium chloride and sodium sulphate - in microwaved model systems enhanced flavours.

(New Scientist No.1804, 18 January 1992, 20)

186 Proposal for duty reliefs on processed foodstuff

The Ministry of Finance is considering a proposal made by some companies to exempt from excise duty the food products manufactured with rice, wheat, corn and other agricultural products as basic raw materials.

At present, foodstuffs which use potato as raw material are exempted from excise duty while industries which use rice, wheat and corn to manufacture food products are levied with the excise duty.

The industry took up the issue with the ministry after several new companies entered the food processing sector where wheat, rice and corn are used as the basic raw materials.

Recently, several new companies have come up in the snack foods segment, especially the breakfast cereals. It was only after the entry of these companies that the formal representation was made to the government.

While official sources in the ministry of food processing industry said that the ministry was not averse to the proposal, sources in the industry say that the finance ministry officials were still tightlipped over the proposal.

A leading snack food manufacturer said that even by the simple logic, the government should exempt the excise duty as the basic raw materials were agricultural products.

Though the revenue loss to the government will not be substantial as there are still very few manufacturers in this sector, it will on the other hand benefit the industry to compete in the international market.

Industry sources say that initial supplies made to the middle-east and other Asian countries had evoked a positive response. According to a manufacturer, the exemption of excise duty will help the industry to meet the international competition better.

It may be recalled that the minister of food processing industry, Mr Giridhar Gomango, had recently said that the government will give utmost importance to the processed food industry. For this, he said that several benefits would be provided to the manufacturers.

But till now, the government has not announced any relief or incentives to encourage the food processing industry. A recent survey, conducted by a voluntary organisation, had revealed that the country was not even utilising 10 per cent of the potential in food processing industry.

While it also argued that the country is not ready for the snack foods, like breakfast cereals, at present, industry sources said that there was tremendous export potential, especially in the middle-east Asian countries.

(The Economic Times 5 January 1992, 13)

187 Food processing industry growth

The food processing industry in the country was expected to achieve an annual growth of around 40 per cent during the Eighth Plan, the Union Minister of State for Food Processing, Mr Giridhar Gomango, said.

Inaugurating a round table on progress in food processing through aluminium packaging he said the growth of the packaging industry was directly related to this.

(Financial Express 14 February 1992, 1)

188 Food processing units hit by lack of infrastructure

The Indian food processing industry has failed to make the grade for lack of proper infrastructure for inventing specialised machinery.

Official sources said that none of the manufacturers were engaged in the development of new lines of plant and machinery for the industry and most of them did not even have the necessary design and development infrastructure for the purpose.

The government has identified that there was a lack of design know-how for at least seven types of equipment: high-speed specialised centrifugal separators, large capacity spray drying and roller drying, high technology evaporation and aroma recovery, specialised heat exchangers for ultra high temperatures, special types of forming and cooking machinery, aseptic processing and packaging and super critical fluid extraction equipment.

The government has finalised a scheme for setting up a chain of "food engineering" centres for research and development of proper equipment for the purpose during the Eighth Plan period.

(Economic Times 12 February 1992, 12)

189 Schemes with Plan panel to boost food processing industry

The Food Processing Ministry has submitted eight schemes worth Rs. 94 crores to the Planning Commission for modernising the food processing industry and to boost the export of the processed products.

The schemes to be taken up in the Eighth Plan would stress on opening food processing training centres in rural areas, setting-up rural food

processing industrial estates and common facilities and assisting food and vegetable processing (F and VP) units, both in the co-operative and joint sector, official sources said.

Other schemes included establishing backward linkage between processor and growers, developing infrastructure for mushroom cultivation and processing and research and development in F and VP industry. A scheme for generic advertising of processed food and providing marketing assistance is also being envisaged.

The officials feel that the constraints which are being faced by the fruit and vegetable industry have to be eliminated by mounting an 'imaginative and planned strategy'.

The recent changes in the industrial policy, which will attract foreign collaborations in this sector would help upgrading technological and marketing abilities. The concessions in excise and import duties, will also go a long way in removing the constraints, sources said.

The scarcity of right quality raw material at world market prices was a major constraint, they said.

The Ministry observes that this industry could not develop its own market for raw material and has to depend on the wholesale market controlled by middle-men.

The existing F and VP units are uneconomical, technological and managerially obsolete. Adding to their problems are the low and uncertain demand for the product in the domestic and international market and the low level of cost-effective packaging technology.

About 70 per cent of processing units are in the cottage, small-scale sector and also suffer from marketing problems on account of lack of resources and skills.

The biggest constraint for the industry is the lack of infrastructural facilities like storing, packaging and refrigeration of fresh produce, which is pre-requisite for these perishable commodities.

The Ministry notes with concern that the country during 1990 exported about 50,000 tonnes of processed products worth Rs. 74 crores while the actual export potential is much higher, the sources said.

So far, the former Soviet Union and West Asia markets have traditionally accounted for almost 80 per cent of the total exports in this sector.

But at the same time, the Ministry underlined that the current annual international trade in preserved F and V is the order of about \$ 7000 million which includes largely of F and V juices, juice concentrates, semi-processed fruit pulps and berries, canned and dehydrated vegetables.

The sources said, the Ministry, however, underlined that in the world's horticulture scenario, India ranks second to Brazil so far as production of fruits are concerned and only next to China in the case of vegetables.

The Ministry, the sources said, expressed concern over the gross under-utilisation of the installed capacity of industry in this sector.

"Hardly 0.5 to one per cent of the annual production of fruits and vegetables gets processed in the country. In contrast, almost 70 per cent of horticultural production goes for processing in Brazil and the US, 78 per cent in Philippines, 83 per cent in Malaysia and 30 per cent in Thailand," the sources said.

Besides this, the Ministry also stressed that a boost to the food processing industry would not only generate substantial employment opportunities but it could also deter population migration from rural to urban areas. The food processing industry has a potential as a good foreign exchange earner, the sources added.

(Financial Express 9 March 1992, 9)

190 Sugar Research Centre in Karnataka

The Karnataka Government is planning to set up a sugar research institute to cater to the needs of the industry. The State Government is studying a detailed project report on the objective and financial resources of the project. Karnataka's share in sugar production is around seven per cent. There are 27 sugar factories in the State, producing 7 lakh tonnes of sugar and this is expected to go up by another one lakh tonnes in the current season. Meanwhile, an action plan has been chalked out by the Sugar Directorate to reorganise the sugarcane department by appointing qualified persons providing the needed infrastructural facilities for effective development and extension programme.

(Industrial Products Finder Annual 1991, 211)

191 Model R&D centre for food products

FICCI and Confederation of Indian Food Trade and Industry (CIFTI) have set up a "model research development and testing centre" at Delhi for food products. It has been recognised by Bureau of Indian Standards (BIS) and Ministry of Food Processing.

This was stated by Mr S.P. Viramani, President, CIFTI, at a seminar on modernisation of the food processing industry on the eve of AHARA 1992.

Mr. Kulwant Rai, Vice-President of CIFTI advised the food processing industry to take advantage of funds being given by the Agricultural Commercialisation and Enterprises Project (ACE), US for strengthening the post farm activities including post harvest handling, transport, cold storage, processing, packaging and marketing.

(Financial Express 18 January 1992, 10)

192 Pact with FAO on vegetable oils

India today signed an agreement with the FAO on the second phase of the long-term policy strategy for vegetable oils.

The agreement was signed by Mr. R.C.A. Jain, Joint Secretary in the Ministry of Agriculture and Mr S.I. Zakhariev, FAO representative in India and Bhutan, says an FAO press release.

The first phase of the project was completed last year which concerned studies on various aspects for the development of the oilseed sector and their long-term implications for production, processing, marketing and consumption.

The present project is an extension of the same study to deliberate on strategies and policy issues for development of oilseeds and identify specific areas for immediate action and technical priorities.

The project is financed by FAO's technical co-operation programme with an allocation of \$ 30,000. The project will be executed by the Ministry of Agriculture through the technology mission on oilseeds.

(Deccan Herald 7 February 1992, 10)

193 **FAO for industrial parks in food processing sector**

The setting up of industrial parks in the food processing sector in the country has been mooted by the Food and Agriculture Organisation (FAO).

In a meeting held here, under the sponsorship of Federation of Indian Chamber of Commerce and Industry (FICCI), between the Confederation of Indian Food Trade and Industry (CIFTI) and FAO, Mr M. Satin, Senior Officer, FAO, Rome said that the industrial parks could bring about an effective production, distribution and waste material management in the food sector.

FAO, under its scheme of Technical Cooperation for Developing Countries (TCDC) will also help in other areas like biscuit manufacturing, poultry feed, ice-cream industry as well as provide technical know-how in setting up efficient food processing units and mobile centres in the country.

According to a press release, FAO will help modernise plants having capacity of about five tonnes for the manufacture of biscuits.

In the poultry sector, FAO is to help develop cheap substitute for the high cost maize poultry feed. In view of the price rise of raw materials, FAO has also suggested ice cream manufacturers to cut down costs.

Mr Satin pointed out that agricultural wastes could be effectively utilised for energy generation for the power requirements of these industrial parks. FAO is also to provide technical know-how for upgrading food processing centres in the country, these have been causing heavy losses in the food sector.

(Deccan Herald 19 March 1992, 13)

FOOD REGULATION, QUALITY CONTROL AND HYGIENE**194** **Prevention of Food Adulteration (4th Amendment) Rules 1992**

G.S.R. 91(E)-Whereas certain draft rules further to amend the Prevention of Food Adulteration Rules 1955 were published as required by sub-section (1) of section 23 of Prevention of Food Adulteration Act, 1954 (37 of 1954), in the notification of Government of India in the Ministry of Health and Family Welfare (Department of Health) No.G.S.R. 595(E) dated the 20th September 1991 in the Gazette of India Extraordinary Part-II, Section 3, Sub-section (i)

dated the 20th September, 1991 at pages 1-7 inviting objections and suggestions from all persons likely to be affected thereby before the expiry of thirty days from the date on which copies of the Gazette of India in which the said notification was published, was made available to the public;

And whereas the copies of the said Gazette were made available to the public on 4/5th November 1991;

And whereas the objections and suggestions received from the public on the draft rules have been considered by the Central Government;

Now, therefore, in exercise of the powers conferred, by sub-section (1) of section 23 of the said Act, the Central Government, after consultation with Central Committee for Food Standards, hereby makes the following rules further to amend the Prevention of Food Adulteration Rules, 1955, namely:-

RULES

1.(1) These rules may be called the Prevention of Food Adulteration (Fourth Amendment) Rules, 1992.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Prevention of Food Adulteration Rules, 1955,:-

(1) in rule 42 for clause (zz), the following clause shall be substituted, namely:-

"(zz) Every package containing an admixture of edible oils shall carry the following label, namely:-

This blended edible vegetable oil contains an admixture of:

(i).....% by weight

(ii).....% by weight

(Name and nature of edible vegetable oils i.e. in raw or refined form)

Date of Packing.....

(2) in rule 44, -

(a) fourth proviso and the fifth proviso shall be omitted;

(b) for the seventh proviso, the following proviso shall be substituted, namely:-

"Provided also that prohibition in clause (e) shall remain inoperative in respect of admixture of any two edible vegetable oils as on edible vegetable oil, where -

(a) the proportion by weight of any edible vegetable oil used in the admixture is not less than 20 per cent by weight and

(b) the admixture of edible vegetable oils, is processed or packed and sold, by the Department of Civil Supplies, Government of India (Dte. of Vanaspati, Vegetable Oils and Fats) or by the agencies in public, private or Joint sector authorised by the Department, or by the National Dairy Development Board or by the State Cooperative Oilseeds Growers Federation or Regional and District Cooperative Oilseeds Growers Union set-up under National Dairy Development Board's Oilseeds and Vegetable Oil Project or by the Public Sector undertakings of Central and State Governments, in sealed packages weighing not more than 5 Kgs. under Agmark Certification Mark Compulsorily and bearing the label declaration as laid down in clause (zz) of rule 42; and

(c) the quality of each edible oil used in the admixture conforms to the relevant standard prescribed by these rules".

(3) in rule 49, after sub-rule (19) the following sub-rule shall be inserted, namely:-

"(20) the Blended Edible Vegetable Oils shall not be sold in loose form. It shall be sold in sealed packages weighing not more than 5 Kg. It shall also not be sold under the common or generic name of the oil used in the blend but shall be sold as 'Blended Edible Vegetable Oil'. The sealed package shall be sold or offered for sale only under AGMARK certification mark bearing the label declarations as provided under rule 42 and rule 44 besides other labelling requirements under these rules".

(4) in Appendix 'B' for item A. 17.24, the following item shall be substituted, namely:-

"A.17.24 - 'Blended edible vegetable oil' means an admixture of any two edible vegetable oils where the proportion by weight of any edible vegetable oil used in the admixture is not less than 20 per cent. The individual oils in the blend shall conform to the respective standards prescribed by these rules. The blend shall be clear, free from rancidity, suspended or insoluble matter or any other foreign matter, separated water, added colouring matter, flavouring substances, mineral oil, or any other animal and non-edible oils, or fats, argemone oils, hydrocyanic acid, castor oil and tricresyl phosphate. It shall also conform to the following standards, namely:-

(a) moisture and volatile matter not more than 0.2 per cent by weight;

(b) Acid value:-

Nature Oil	Acid value
(1) Both raw edible vegetable oils in the Blend	Not more than 6.0
(2) One raw edible vegetable oil and one refined edible vegetable oil in the Blend	Not more than 5.0
(3) Both refined edible vegetable oils in the Blend	Not more than 0.5
(c) Un-saponifiable matter -	
(i) Blend with rice bran oil	Not more than 3.0 per cent by weight
(ii) Blend with other edible vegetable oils	Not more than 1.50 per cent by weight
(d) Flash point (Penske Martin, closed method).	Not less than 250°C

[No. P. 15025/46/91-PH(F&N)PFA]

B.S.LAMBA, Jt. Secy.

(Gazette of India Part II-Section 3-Sub-section(i) No.62, 1992)

195 Ghee grading and marking (Amendment) Rules 1991

G.S.R. 694 - Whereas certain draft rules further to amend the Ghee Grading and Marking Rules, 1938 were published as required by Section 3 of the Agricultural Produce (Grading and Marking) Act, 1937 (1 of 1937) under the notification of the Government of India in the Ministry of Agriculture, Department of Rural Development No. 45011/2/90-MI dated 11-1-1991 as GSR 69 on page 287 of the Gazette of India, Part II, Section 3, Sub-Section (i) dated 2-2-91, inviting objections and suggestions from persons likely to be affected thereby before expiry of the period of forty-five days from the date on which copies of the Gazette containing the said notification are made available to the public;

And whereas copies of the said Gazette were made available to the public on 23-2-91.

And whereas the objections and suggestions received from the public in respect of the said draft rules have been considered by the Central Government;

Now, therefore, in exercise of the powers conferred by section 3 of the said Act, the Central Government hereby makes the following rules namely:

RULES

1. These rules may be called Ghee Grading and Marking (Amendment) Rules, 1991.

2. In the Ghee Grading and Marking Rules, 1938 (hereinafter referred to as the said rules), rule 2 shall be renumbered as rule 2-A, thereof and before rule 2-A so, renumbered the following shall be inserted, namely:-

"2. Definitions - In these rules, unless the context otherwise requires:-

(1)"Agricultural Marketing Adviser" means the Agricultural Marketing Adviser to the Government of India;

(2) "Authorised packer" means a person or a body of persons who has been granted a certificate of authorisation to grade and mark the commodity in accordance with the grade standards and procedure specified under these rules;

(3) "Certificate of authorisation" means a certificate in prescribed proforma issued under the General Grading and Marking Rules, 1988 authorising a person or body of persons to grade and mark an article with grade designation marks;

(4) "Schedule" means a schedule appended to these rules".

3. For rule 4 of the said rules, the following rule shall be substituted namely:-

"4. Grade designation marks - The grade designation mark shall consist of;

(i) A label specifying the name of the commodity grade designation and bearing a design consisting of an outline map of India with the word "AGMARK" and the figure of rising sun with the word "Product of India" and "भारतीय उत्पाद" resembling the design as set out in Schedule-II; or

(ii) "Agmark Replica" consisting of a design incorporating the number of certificate of authorisation, the word "AGMARK", name of the commodity and grade designation and resembling the design as set out in Schedule-II-A provided that the use of Agmark Replica in lieu of Agmark labels shall be allowed only to such authorised packers, who have been granted permission, on application in writing, by the Agricultural Marketing Adviser or an officer authorised in this behalf and subject to the conditions specified in sub-rules (3) to (6) of rule 10 of the General Grading and Marking Rules, 1988".

4. For rule 5 of the said rules, the following rule shall be substituted namely:-

"5. Marking Provisions - (1) The grade designation mark in the form of label shall be securely affixed to such sealed contained of ghee in a manner as specified from time to time;

(2) The grade designation mark in the form of replica shall be clearly and indelibly printed or embossed on such containers as permitted by the Agricultural Marketing Adviser or an officer authorised in this regard, and in a manner as specified from time to time;

(3) In addition to the grade designation mark, each container shall be clearly marked with the following particulars, namely:-

- (i) Name of packer
- (ii) C.A. Number
- (iii) Place of packing
- (iv) Melt No.
- (v) Date of packing*
- (vi) Net weight

*N.B.- The date of packing shall be the date of completion of the analysis of the sample".

5. For rule 6 of the said rules, the following rule shall be substituted, namely:-

"6. Method of packing - (1) The ghee shall be packed hygienically in clean, sound and new tins with or without lacquering inside or clean glass bottles or clean, sound and new food grade plastic containers:

Provided that the use of such plastic containers shall have the approval of Agricultural Marketing Adviser or an officer authorised in that behalf regarding the suitability of the packing material for food contact applications with specific reference to ghee.

(2) The glass bottles, if returned by the consumers, may be used again for packing ghee after proper cleaning and disinfection;

(3) The container of ghee shall not be composed whether wholly or part, of any poisonous or deleterious substance which renders the contents injurious to health;

(4) The container shall be free insect infestation fungus contamination or any obnoxious and undesirable smell;

(5) Each package shall contain ghee of one melt only;

(6) Each container shall be securely closed and sealed in a manner as specified from time to time;

(7) Net weight of ghee packed in container shall be in accordance with the standard sizes or unit of packing as prescribed under the relevant instructions".

6. In rule 7 of the said rules, for the word and the figures "Rule 4" and "1937", the word and figures "Rule 3(8)" and "1988" shall respectively be substituted.

7. In Schedule-1, to the said rules, for the figure '2' in the parenthesis under the heading, the figure '2-A' shall be substituted.

8. For Schedule-II to the said rules, the following Schedule shall be substituted, namely:-

"Schedule II
[See rule 4(i)]
Grade Designation Mark
(Design on the label)

9. For Schedule II-A to the said rules, the following Schedule shall be substituted, namely:-

"Schedule II-A
[See rule 4(ii)]
Grade Designation Mark
(Design of Agmark replica)
Name of Commodity : GHEE
Grade:

10. In Schedule IV, to the said rules -

(i) In paragraph: (d), for the words

"Central Control Laboratory", the words "Regional Agmark Laboratory" shall be substituted;

(ii) The paragraph (f) shall be ommitted;

(iii) The paragraph (g) shall be renumbered as paragraph (f) thereof;

(iv) Paragraph (h) shall be renumbered as paragraph (g) thereof;

(v) The paragraph (i) shall be renumbered as paragraph (h) thereof and the portion beginning with the words "but in respect" and ending with the words "set out below" appearing in the said paragraph shall be omitted.

(vi) The paragraph (i) shall be omitted.

Note - (1) Principal rules published under the notification of the Government of India, Imperial council of Agricultural Research No.F-51-(45) 38/G.I., dated 29-7-38 in the Gazette of India, part I, dated 30-7-38 (P).

(2) First amendment published as S.R.O. 645 dated 10-9-1950 in the Gazette of India, Part II. Section 3 dated 23.9.1950.

(3) Second amendment published as S.O. 2344 dated 22.9.1961 in the Gazette of India Part II Section 3(ii) dated 30.9.1961.

(4) Third amendment published as S.O. No.3182 dated 5.12.1966 in the Gazette of India, Part II, Section 3(ii) dated 17.12.1966.

(5) Fourth amendment published as S.O. 1101 dated 17.3.1981 in the Gazette of India, Part II, Section 3(ii) dated 4.4.1981.

(Gazette of India Part II-Section 3-Sub-section(i) No.50, 1991, 2815-2817)

196 New and revised Indian Food Standards

IS 13243: 1991	Spices and condiments - Amchur, raw mango (<u>Mangifera indica</u> (Linn) powder. Gr 1
IS 13245:1991	Pesticides - Determination of residue in agricultural commodities, foods, soil and water - Aldrin (including dieldrin). Gr 2
IS 13266 : 1991	Instant curried dal mix. Gr 2
<i>(Standards India 5(8), (9), 1991, 307, 343)</i>	

197 Biotech-threat to food security ?

Present trends in biotechnology will increase the vulnerability of food supplies, hurt the world's poor and may not solve hunger. That, in a nutshell is the view of 50 non-governmental organisation (NGOs) from over a dozen European countries and Third World development project agencies, who met recently in Barcelona, Spain.

Most biotech research is being done by or for the benefit of large international companies in the affluent industrialised countries. These have already bought up most of the small seed companies following the introduction of plant breeders rights and are now pressing for patent legislation to be extended to living organisms so they may control the technology.

Some developing countries could find their products no longer needed as companies develop substitutes that can be factory produced, for example, vanilla and cocoa butter substitutes. Farmers could find themselves having to pay for seeds they have grown and want to plant next year, if it contains a gene put in by a company, or get locked into using pesticide-tolerant plants that tie them to particular chemical treatments. The Barcelona meeting urged adoption of the so called fourth criterion - need - in any developments in this field with need broadly defined in relation to the environment and society as a whole, including poor farmers, not simply the rich or the balance sheets of large companies.

The push for patent protection - originally designed for industrial products - into living organisms in privatising the common asset of human kind which has been freely shared in developing new varieties. The plants used as sources of genes have often been developed by small farmers in developing countries and are part of their natural heritage. Participants feared that control of the basic requirements for food production was moving into the hands of large companies from the affluent industrialised countries. What was needed was biotechnology research geared to reducing input requirements and enhancing genetic diversity. Simple mass selection to improve local varieties is one example of under-supported research. Work on enhancing multiple cropping and rotation techniques, rationalisation of the use of wild plants in local diets and the upgrading of traditional crop protection practices are just a few others needing greater attention.

The meeting called for a halt to any further moves to patent biological processes until after the UN Conference on the Environment in June 1992 in Brazil, which is due to produce a global convention for the conservation and

utilisation of biological diversity. The groups saw the development of new biotechnology-based clones and varieties as posing a further threat to the genetic resources of the planet and also increasing the vulnerability to food supplies, for example, through the introduction of resistance to pests or disease based on a single gene to a wide range of crops.

(Chemical Weekly 37(19), 1992, 106)

198 Palmitic acid good for heart

The Palm Oil Research Institute of Malaysia claimed today that palmitic acid, one of the major saturated fatty acid component of palm oil had been found to reduce cholesterol levels by ten per cent in human study conducted with the cooperation of the army. The latest finding adds to the long list of nutritional qualities which, according to the institute, disproves the propaganda that palm oil consumption was injurious to health.

Dr. Abdul Halim Hassan, Director-general of the Institute told a news conference at Kuala Lumpur on August 7, that this was the first time such a study had been done on humans after having experimented successfully the effect of diets rich in palmitic acid on primates.

The breakthrough came after a well controlled cross-over human study was conducted at an army camp using 18 volunteers from the army January to April this year, he said. Dietary fat blends containing either lauric plus myristic fatty acids as the saturated fat (derived by a blend of coconut/palm kernel oils) or palmitic acid (a blend of palm oil and palm stearin) were used as the test fats. These were incorporated into freshly cooked Malaysian type diets and consumed by the volunteers for four-week durations. Blood samples were analysed for the effect of these diets on serum liquids, lipoproteins and other biochemical indices.

Volunteers consuming the palmitic acid-enriched diet had lower serum total cholesterol (3.96 to 0.45 mmol/litre) than those consuming the lauric plus myristic enriched diets (4.37 to 0.62 mmol/litre), Dr. Halim said. A similar trend was established when the important cardiovascular risk factor, LDL, or low-density-lipoprotein cholesterol was measured. The palmitic acid-enriched diet caused a significant 12.5 per cent lowering of the LDL-cholesterol compared with the lauric plus myristic enriched diets.

(The Oils and Oilseeds Journal July/October 1991, 99-100)

199 An enzyme inhibitor lowers egg cholesterol

Lovastatin a competitive inhibitor of 3-hydroxy-3-methyl glutaryl-co-enzyme, a reductase, the rate limiting enzyme in the biosynthesis of cholesterol, has been added to laying hens' diets. With addition of up to 0.24% lovastatin in the hens' diet the cholesterol level in their eggs was reduced by up to 15%. No drug residues were detected in extracts from the eggs.

(Chemical Weekly 37(17), 1991, 104)

200 Eating less fats extends average life only a few months

According to study carried out by Warren S Browner of University of California, San Francisco, reducing intake of fatty foods will not necessarily add more years to the average life of Americans.

The study concludes that even if every person in the US restricts dietary fat consumption to the level recommended by many national health authorities, the average life expectancy will increase only by three months for women and four months for men. These results may be disappointing to those who believe that following a healthier diet will protect them from early death.

Scientific and health advisory panels have recommended that Americans reduce their dietary fat intake from its present average age of 37% to no more than 30% of total calories. It is believed that restricting fat, especially saturated fat, will reduce cholesterol and decrease the rates of coronary heart disease. Some studies also suggest that consuming less fat might reduce deaths from cancers of the breast, colon and prostate.

Browner's 'best case' estimates are based on the same general assumptions about relationship between dietary fat, serum cholesterol, coronary heart disease and 'fat-related' cancers that were used to formulate current dietary fat recommendations.

He developed a model using census information, national health statistics and accepted scientific data on the effect of fat on cholesterol levels to arrive at his estimates.

The study showed that restricting fat to a maximum of 30% of calories could reduce heart disease deaths by 5 to 20% depending on age. For

example, the recommended diet would reduce heart disease deaths by 20% and 11% respectively, among men and women who are 35 yr of age, and 5 and 6% among men and women who are over 65 yr.

Because few young people die of fat-related diseases, the recommended diet would affect primarily the mortality rate of older people. Only 1,100 deaths among women and men, aged 20-39, will be reduced each year if all Americans followed the diet recommendations. This compares to 12,000 fewer deaths among those 70-79 yr and 9,900 deaths among people over 80. Thus, the policy of modifying fat intake for the whole population will have a modest effect in preventing premature (before age 65) mortality.

Even these estimates may be more optimistic, as they assume that the entire US will limit dietary fat to 30% for the remainder of their lives, and that reduction of fat entirely reverses the risks of death from fat-related diseases.

The estimates also do not take into consideration other studies that have linked cholesterol-lowering efforts to higher rates of deaths from several non-heart disease causes, including accidents, suicide and homicides. If dietary changes that reduce serum cholesterol levels do cause an increase in non-illness deaths, which tend to occur at an earlier age than deaths from coronary heart disease and the fat related cancer, then any benefits of restricted fat diet would likely be reduced or even reversed.

The study will be useful to planners setting national health priorities, physicians advising patients, and for Americans deciding what to eat.

The potential benefit of fat reduction would be greater in someone who has manifest coronary heart disease (CHD), or risk factors for CHD or one of the fat related cancers, but would be less in someone who has no risk factors.

From the public health point of view, an increase of three months in life expectancy in the US multiplied by 240 million Americans results in about 60 million yr additional life, although it would require about 90% of the population to modify its fat intake.

From the individual perspective, a possible gain of three or four months of life expectancy is difficult to comprehend, since those benefits would be greater for some persons, but zero or perhaps negative for several others.

(Journal of Scientific and Industrial Research 50(9), 1991, 694- 695)

201 Low-cholesterol eggs

Until now, those afraid of cholesterol had to eat egg products from which the yolk, which gives the eggs the "eggy" taste, had been removed. But no one of America's largest producers, Michael Foods Inc., claims to have produced low-cholesterol liquid eggs containing yolks but with less cholesterol. The one thing not possible with the new product is, of course, sunny side up, that is a fried egg with the beautiful yellow yolk against a white. Fear of heart attack due to the high cholesterol in eggs and salmonella bacteria poisoning have reduced egg consumption in the US, sending the industry into jitters. Of course the liquid egg will cost more than double the eggs the hen lays.

(Deccan Herald 21 February 1992, 11)

202 Ohmic heating

Britain's government last week approved a new form of food sterilisation called "ohmic heating". The technique involves passing an electric current through ready-made meals. The food acts as a resistor and heats up in the same way as the filament of an electric fire.

Paul Skudder of APV-Baker in Crawley, Sussex, which owns a license to sell the technology, claims that liquid in the food does not get overheated, and nutrients survive better than in canning. Also, chunks of food are heated evenly and do not become mushy on the outside.

(New Scientist 8 February 1992, 19)

203 Dishwashing - A new era for enzymes in affluent countries

The interest in using enzymes in automatic dishwashing detergents (ADDs) has increased recently particularly in Japan and W. Europe. This is reflected in the launching in 1990 of enzymatic ADDs in several European countries (Austria, Germany, Switzerland, Denmark and UK). In Japan all major ADDs brands contain enzymes to-day, whereas only one brand in the USA market currently contains enzymes.

The explanation for the late entry of enzymes in ADDs is that the market has been dominated by formulations incorporating chlorine, which inactivates enzymes. Environmental and safety considerations have created recently a strong interest in new formulations without metasilicate, and with no or reduced phosphate. In such formulations, enzymes have proven to help maintain high performance. Chlorine is replaced by peroxygen bleaches to allow the application of enzymes in these new ADDs. The development of

new ADDs reflects the growing demand for "green" and safe products. This trend probably will become even stronger in coming years. Therefore, enzymes are expected to further penetrate the ADDs markets.

So far, two benefits of adding enzymes to ADDs are well established. First, amylases and proteases remove starch and proteinaceous soiling effectively from the dishware. Enzymes reduce droplet formation which leads to an over-all cleaner appearance. Second, the enzymes not only make it possible to switch from traditional to new formulations (and still maintain the performance level) - but they also can bring along a performance which is even better than before.

(Chemical Weekly 37(19), 1992, 103)

TRANSFER OF TECHNOLOGY AND NEW INDUSTRIES

204 Golden Soya's M.P. project

Golden Soya Ltd., promoted by the Nisha Synthetics group, is setting up a project for the manufacture of solvent extraction of soya oil and export of soya meal. The plant will have an installed capacity of 60,000 tonnes per annum of soyabean at Bhanpori in Madhya Pradesh at a cost of Rs. 8.10 crores in a phased manner.

In the first phase the company plans to acquire an existing solvent extraction plant at Madhya Pradesh with an installed capacity of 20,000 tonnes. In the second phase a solvent extraction plant will be erected with a capability of 40,000 tonnes per annum.

(The Hindu 6 March 1992, 12)

205 Indo-Nissin Foods Unit on stream

The Indo-Nissin Foods Ltd's unit, set up at Jigani industrial area in Bangalore, has been commissioned recently. The company set up at a cost of Rs 15-crore will initially make hi-tech instant noodle soup. This is a joint venture project between Nissin Food Products Co Ltd and C Itoh and Co Ltd of Japan, Accelerated Freeze Drying Co, Cochin and Brooke Bond India Ltd. After the commissioning of the plant, the Union Minister of Food Processing Industries, Mr Giridhar Gomango, called for the well-organised development of food processing industry, which has great potential in the country.

(Chemical Products finder 10(8), 1992, 141)

206 Lotus to make new products

Lotus Chocolates Co Ltd, an Andhra Pradesh based company, will for the first time introduce sugar-free and low-calorie chocolates in the Indian market. Besides, the company also plans to market institutional products like cooking and baking chocolates and cocoa powder, which will be used in the manufacture of brown beverages. Lotus has also entered into a sub-contract conversion arrangement with Britannia Industries Ltd for the manufacture of a range of chocolate products. The company's project is estimated to cost about Rs. 8.40 crore. Chocolate Confectionery Consultancy of the UK, who are specialists in the areas of formulation of recipes and product development, have been retained to provide technical services for a period of three years.

(Chemical Products Finder February 1992, 146)

207 New mineral water

Manufacture and sale of mineral water is the latest stop for Shriram Group's diversification drive. The city-based chit and hire-purchase group has tied up with a small-scale unit near Mahabalipuram which can produce two lakh bottles of mineral water per shift.

According to the company spokesman, the demand for mineral water in a month now estimated at two million bottles is expected to grow at the rate of 15-20 per cent a year.

(Financial Express 18 March 1992, 4)

208 Kanha Vanaspati's Plant in UP

Kanha Vanaspati Ltd, a company promoted by the Atul Glass Group in the joint sector with UPSIDC Ltd, has set up a Rs 9-crore project at Ujhani in Badaun district of Uttar Pradesh. The plant will manufacture 18,750 MT of vanaspati per annum. The plant, which launched commercial production in March last year, has recorded a turnover of about Rs 17 crore. The company's plant is operating at 80 per cent capacity.

(Chemical Products Finder February 1992, 156)

209 Kothari Soya's New Plant

Kothari Soya Ltd is setting up a plant at Kota in Rajasthan for solvent extraction of soyabean and rapeseed, with an installed capacity of 275 tonnes per day and refining of 50 tonnes per day of crude oil. The total cost of the project is estimated at Rs. 9.40 crore.

(Chemical Products Finder February 1992, 147)

210 Pankaj Agro setting up solvent extraction unit

Pankaj Agro Protinex Ltd., is setting up a solvent extraction plant and vegetable oil refinery with a capacity of 400 tpd and 30 tpd capacity respectively at Dabok, a centrally declared 'B' category backward area of Rajasthan.

The total cost of the project is estimated to be Rs. 680 lakhs appraised by IFCI which have also sanctioned a term loan of Rs. 220 lakhs for the project.

The project is in an advanced stage of implementation and the trial production is expected to start by March 1992 and commercial production soon after.

(Financial Express 12 February 1992, 10)

211 Thapar Foods Plans new oil complex

Thapar Foods Ltd has undertaken an ambitious expansion plan for setting up an integrated edible oil complex at village Kushkera in Bhiwadi district of Rajasthan. It includes a vanaspati ghee plant (50 tonnes per day), solvent extraction plant (150 TPD), refined vegetable oil plant (50 TPD). The company also proposes to modernise its existing unit at Ludhiana by installing latest equipment and machinery. The total cost of these projects comes to around Rs 19.35 crore. The company has already successfully implemented a dal processing plant of 50 tonnes per day capacity at Ludhiana. It has reaped a total income of Rs. 8.87 crore for the year 1990-91.

(Chemical Products Finder February 1992, 144)

212 Tri-Star soya plans new plant

Tri-Star Soya has proposed to set up a vanaspati plant for the manufacture of 30,000 tonnes per annum of the oil and a lecithene plant with a capacity of 1,500 tonnes per annum. The project is estimated to cost about Rs. 10 crore.

(Chemical Products Finder February 1992, 148)

PERSONALIA**213 New CMD of Modern Food Industries**

Dr M.M. Krishna has taken over a Chairman-cum-Managing Director of Modern Food Industries (India) Limited, a leading food processing industry, under the Ministry of Food Processing Industries.

Dr Krishna is an eminent food technologist having wide experience of working in India and abroad, according to an official release.

(Economic Times 13 February 1992, 7)

SPECIAL ARTICLE**MEMBRANE PROCESSES IN FOOD INDUSTRIES****A.M. NANJUNDASWAMY****Central Food Technological Research Institute, Mysore-570013.**

Membrane Processes, which find applications in food industries, include Ultrafiltration (UF), Reverse Osmosis (RO) and Electrodialysis (ED). In all these, the membrane acts as a selective barrier either enriching certain components or depleting some other components in a feed stream (1). Ultrafiltration is essentially a filtration where molecules are separated by their size. The UF membranes have a pore size of 2 to 200 nm and are defined by their molecular weight cut off (MWCO). Ultrafiltration is ideal for the clarification, separation and concentration of organic compounds.

Reverse Osmosis (membrane pore size 0.5 to 1.5 nm) is the technique of separation of molecules. The mode of separation is complex than that can be explained by molecular size only. RO is generally used for desalinating or dewatering (concentration) and the membranes are defined by their ability to reject salt. Electrodialysis (membrane pore size about 1 nm) is separation of molecules based on their net charge. Negatively charged molecules readily permeate only through a positively charged membrane and vice versa. The driving force in electrodialysis is direct electric current (2).

Membrane processes offer many advantages (1) like low energy, no chance of thermal damage to heat sensitive flavour and other components of the liquids as the process is done at ambient conditions, compactness of the plant, flexibility in the location of the plant, lower operation cost, improved product quality, improved yield, cold sterilisation etc. Membrane fouling and cleaning difficulties are the major disadvantages (2). Comparative merits and demerits of three types of concentration processes are presented in Table 1.

Application of membrane processes in the food industry include concentration of milk, adjustment of protein in milk, removal of salts and lactose from milk and whey, whey concentration, sugarcane juice purification and concentration, natural pigment purification and concentration, fruit juice clarification and concentration, deacidification of fruit juices, concentration of pectin solution, food enzyme purification and concentration, vegetable protein concentration, coconut water concentration, high fructose corn syrup production and ultrapure water (1-6). All these aspects of membrane processes have been reviewed and briefly presented in this paper.

Membrane in milk and whey processing

Dairy applications of membrane processes dominate as compared with other food applications. Worldwide about 150 RO plants are reported to be in operation in the dairy industry of which over 100 plants are in USA alone (7).

Concentration of milk

RO is mainly used for concentration of whole as well as skim milk primarily for reducing the transport cost, preconcentration for later conversion into other dairy products. Double concentration by RO results in 50 per cent reduction in transport cost. Other benefits are savings in chilling cost and storage facilities.

Concentrated milk could be utilised for later conversion into fluid products like flavoured milk, ice cream, high protein milk, preparation of cream and butter, yoghurt, dried products like whole milk and skim milk powders and khoa, an important indigenous Indian milk product. Khoa prepared from RO concentrated milk has slightly higher moisture content and significantly higher fat and lower ash content on dry weight basis in comparison with control khoa made by conventional method. This resulted in increased yield. The flavour and texture are not very much affected by RO (Table 2). By RO process a considerable savings in energy could be realised as it needed 6 to 7 kcal/kg of milk, compared to 70 to 90 kcal/kg using evaporators and 330 kcal/kg by conventional open boiling. Development of a continuous commercial method for making khoa is possible combining RO plant and an heat exchanger (8).

Whey processing

One of the well-known food processing applications of membrane is cheese whey processing. Cheese manufacturing plants discharge large volumes of whey as a waste.

Table 1

Comparative advantages and disadvantages of three types of concentration processes

Particulars	Evaporative concn.	Freeze concn.	Concn. by Reverse Osmosis
Concentration limit ($^{\circ}$ Brix)	75	55	25
Viscosity limit (cps)	200-4000	200	150
Capacity limit (tons of water removal/hr)	1.5-75.0	5.0	15.0
Energy requirement (kwh/1,000 kg water removal)	626	92	14
Capital cost	Low	High	High
Operating cost	High	High	Low
Loss of solids	2%	Upto 10%	0.3%
Loss of volatiles	Lost completely	Least	Partial

Table 2

Composition and quality of Khoa Manufactured by R.O.

Composition (%)	Control Khoa	RO Koha*	
		2.0 X Conc. milk	2.5 X Conc. milk
Moisture	32.3	38.6	39.7
Fat**	28.9	30.3	30.3
Protein**	28.5	28.8	29.0
Ash**	5.9	5.1	5.0
Lactose**	36.7	35.8	35.6
Sensory Quality: Flavour	Typically Khoa	Slightly mild	Slightly mild
Texture	Granular	Lack grains	Lack grains
Hunter Colorimeter Values: L	69.3	67.0	67.8
a	-4.1	-1.5	-3.1
b	19.5	16.7	15.7

*Milk pasteurised at 63 C/30 min before concentration by RO

**Values on dry matter basis

(Source Pal and Cheryan, 1987).

Whey contains about 0.8 per cent lactalbumin, 5.0 per cent lactose and 1.0 per cent minerals and the large BOD (30,000 to 50,000 ppm). Whey discharged into sewer lines caused a major problem for sewage treatment plants (8). For waste discharged into river it should have a BOD of less than 20 mg/litre. A flow diagram for processing whey by membrane process for

production of valuable whey products simultaneously solving the waste disposable problem is presented in Figure 1. Advent of commercially feasible UF and RO processes has made this possible. The whey is first ultrafiltered to remove the low molecular weight minerals and lactose and simultaneously concentrating the protein to about 15 per cent. The protein concentrate is spray dried and is a valuable byproduct. The lactose mineral solution is dewatered using RO to 20 to 30 per cent and dried. The economics of this process lies in the fact that the cost of alternate means of disposal of whey is prohibitive.

Purification and concentration of sugarcane juice

There is a great scope for use of UF and RO processes in the simultaneous purification and pre-concentration of sugarcane juice. This is not only brings down the cost of clarification and concentration, but can also release large quantity of baggase (used as fuel for raising steam) for use as raw material in paper manufacturing industry. Sugarcane juice could be double concentrated at 1/10th cost of that of evaporative concentration.

Moreover, any purity improvement will result in better recovery of sugar. Work done has shown the possibility of using Electrodialysis for demineralisation of sugarcane juice thereby reducing the ash content from 5,280 ppm to 1,000 ppm. The energy requirement is shown to be about 3 kwh/m³ of cane juice purified (9). An industrial plant is reported to be working in Japan with 700 m² membrane area to remove 48 tonnes of ash per day. The consumption of electrical energy is reported to be 1.1 kwh/kg of salt removed (10). Sugarcane juice is a popular drink in India. Good quality sparkling clear juice can be obtained by UF by one step process and directly packed aseptically for marketing.

Natural colour concentrate

Attempts are being made to develop natural colourants (11). Two major classes of water soluble natural colourants used in foods are anthocyanins, betanins (pink pigments) and carthamin (yellow pigments). Natural colour extracts containing these colourants contain 0.1 to 0.2 per cent colourant and 6 to 8 per cent dissolved solids. The high ratio of solids to colour in the extract, limit the maximum concentration of colour (1) achievable by evaporation to 1.0 to 2.0 per cent.

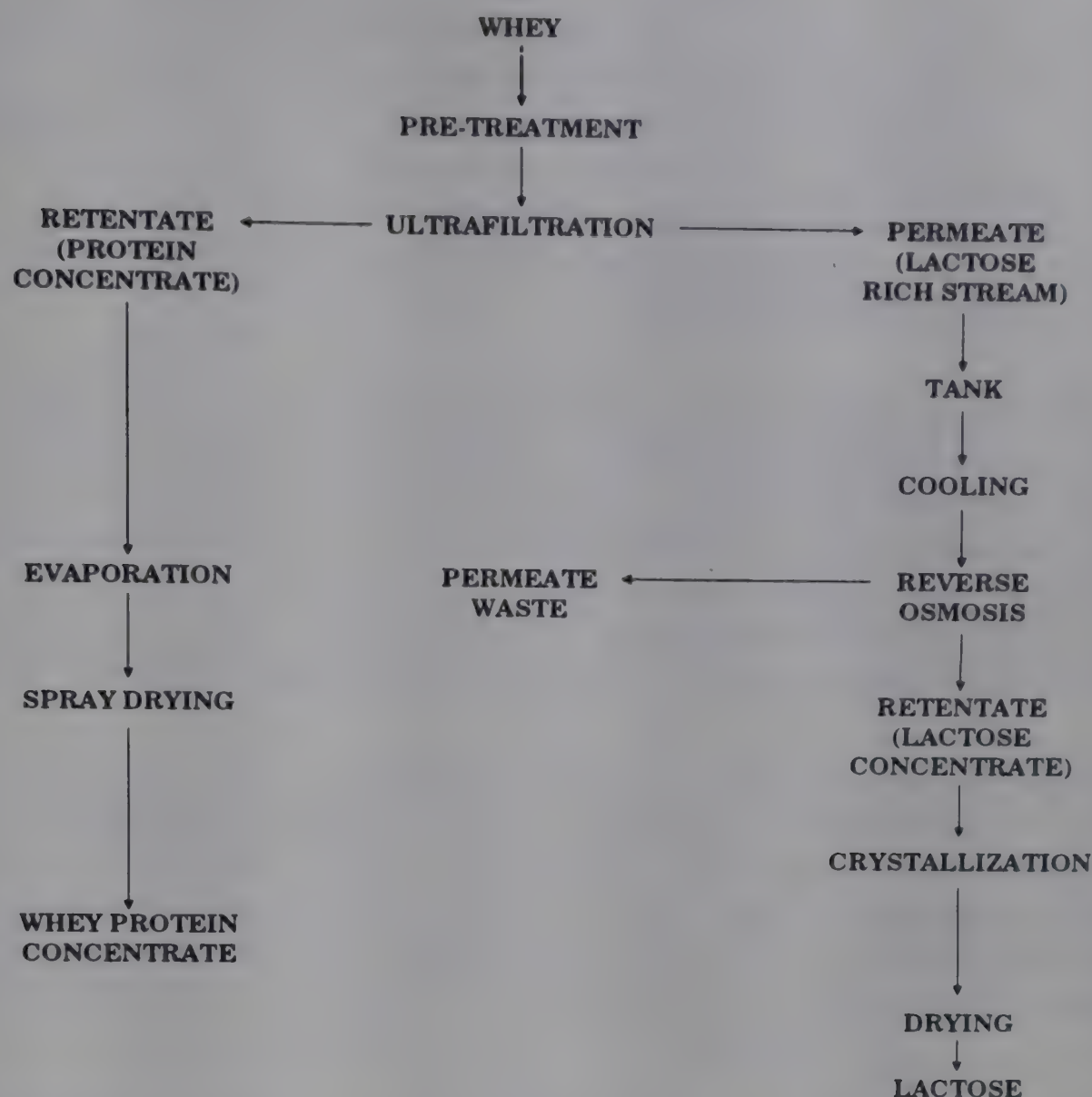


FIG. 1 FLOW SHEET ILLUSTRATING THE PRODUCTION OF WHEY PROTEIN AND LACTOSE FROM WHEY

Removing dissolved solids and water by UF and using RO for further concentration, comparatively pure colour concentrate (nearly 10%) could be obtained at a competitive cost (1). A pilot scale process has successfully been developed for purification and concentration of betalaines (beet juice) by UF and RO for use as natural colourant (12).

Fruit juice clarification and concentration

The conventional pressing, clarification (chemical or enzymatic) and vacuum evaporative process for apple juice production and concentration is laborious and time-consuming and require high amount of enzyme as well as filter media. Moreover, due to many a number of process steps, this procedure leads to about 5 per cent losses in yield.

When UF used in conjunction with RO it is found to result in increased juice recovery, enhanced product quality, reduced cost, cold sterilisation as microorganisms do not pass through UF membrane. Hence application of UF and RO as a prestep concentration process in the case of apple juice has now become commercial reality. Combining UF and RO and integrating them with aroma recovery and vacuum evaporation, a process has now been developed to concentrate apple juice upto 72° Brix with all the desirable qualities at very comparative cost. The schematic diagram of the integrated process (13) is shown in Figure 2.

The major problems in concentration by RO have been concentration polarisation, fouling of membrane and only partial retention of flavour. The membrane made of cellulose acetate was also sensitive to temperature, pH and chlorine-cleaning operations and also led to rupture during high pressure operation. Now newer types of membranes made of non-cellulosic synthetic polymer (Polyamide, Polysulfone, Polyethyleneine etc) have wide pH (0.5 to 13.0), temperature up to 90 C tolerance and withstand pressure up to 80 bar.

The comparative performance of cellulosic and non-cellulosic membrane during concentration of apple juice by RO is presented in Table 3. These high resistance membranes have contributed to high retention of apple aroma, soluble solids and acidity (14). However, even with the improved membrane high concentration of fruit juices beyond 35° Brix has not been achieved. At present, RO has therefore been recommended as pre-concentration step.

Table 3
Comparative performance of cellulosic and non-cellulosic
membranes during concentration of apple juice by reverse osmosis
(operative pressure: 40 Bar, 20 °Brix, 20°C Temp.).

Membrane type	Soluble solids	Acidity	Per cent recovery of			Average processing capacity L/m ² h
			Total flavour volatiles	Apple flavour volatiles	Ethanol	
Cellulosic						
CA 865	82.2	63.9	20.0	13.6	24.8	26.3
CA 990	94.8	82.6	21.4	13.8	28.8	13.5
Non-cellulosic						
HR 95	97.0	93.4	85.2	87.7	75.0	12.9
HR 98	97.4	96.6	86.0	85.6	74.0	11.7

Source: Sheu et al (1983)

**Fig. 2. Concentrating juice with reverse osmosis
(integrated process)**

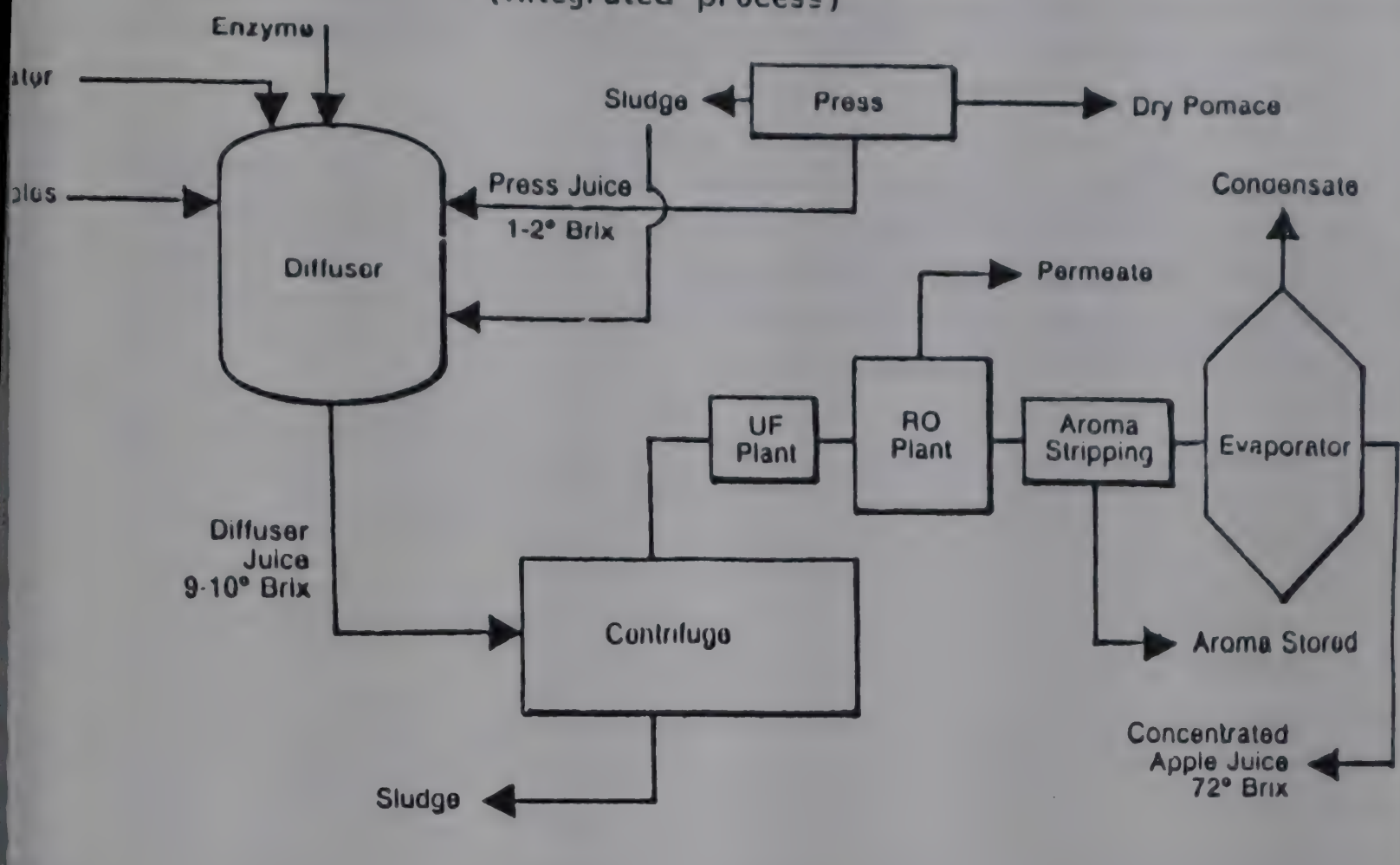


Table 4

Cost comparison for apple juice clarification

	UF	P & F*
Energy	0.26	-
Chemicals	0.26	2.90
Maintenance	0.65	-
Labour	0.82	2.64
Membranes	0.79	-
Filter aid	-	6.08
Total operating cost (\$ 1,000 litres)	2.78	11.62
Saving (per 100-day season)	\$ 301,444	
Capital cost	\$ 430,000	
Internal rate of return (%)	81.3	

*Analysis is very sensitive to process yield improvements credited to the UF step. Does not account for increased revenues in UF process gained by converting to a continuous process.
(Source Cheryan, 1989).

It is also reported that if a processor removes one half of the juice water through pre-concentration by RO and one half of the water through evaporation, the overall cost per gallon would be \$ 0.036 compared to \$ 0.056 for traditional evaporator (15).

Fouling of membrane and intermittent cleaning are the problems involved in the membrane process. Recent work has indicated that by addition of 0.003 per cent Poly (ethylene oxide) to 0.5 per cent NaOH solution, cleaning time for pectin fouled surfaces could be reduced to 2 min compared to 60 min with NaOH solution alone (16).

The aroma of orange juice is considerably more complex than that of apple juice. This is because much of the aroma residues is in an oil phase present in the juice in the form of an emulsion. These aroma molecules which are hydrocarbons for the most part are only sparingly soluble in water and hence are easily retained, besides some water soluble esters, alcohols and aldehydes (17). Orange juice could be concentrated by RO up to 50 per cent water recovery with a polyamide membrane. Pectinase treatment is required to prevent fouling and to allow cleaning in place procedure. Solute recovery of sugars and organic acids are presented in Table 5. Solute recovery and membrane rejection of volatile flavour components of orange juice (18) is shown in Table 6.

Table 6

Solute recovery and membrane rejection of volatile flavour components (at 2.0 WCR, at 6.21 MPa with enzyme treatment)

Flavour component	Solute recovery (%)	Membrane rejection (%)
d-Limonene	89.0	83.1
Linalool	87.3	80.5
Ethyl furoate	95.0	92.6
Sesqui terpene	80.5	68.8
Terpinol	92.1	88.1
Oxy-compound	92.5	88.7

(Source: Medina & Caicia, 1988).

Concentration of orange juice to 25.2 °Brix, grape fruit juice to 25.1 °Brix and lemon juice to 25.5 °Brix by RO has been studied in detail using 2F 99 composite membrane system (19). Characteristics of feed concentrate and permeate streams of these juices are presented in Table 7. Values show reduction in pulp and volatile oil (limonene) during concentration. Only

marginal sugars enter the permeate stream. There was no measurable acid, vitamin C, volatile oil and pectin in the permeate showing good retention of these in the juice concentrates prepared by RO.

Pineapple juice concentration can be concentrated by RO without requiring any clarification up to 25 °Brix. RO concentration at higher temperatures did not adversely affect the product quality or permeate flux rate. Losses of soluble components including ascorbic acid into the permeate were very slight. Loss of some volatiles during RO did not appear to affect the sensory quality of reconstituted pineapple juice (20). Tests in concentrating tomato juice from 5 °Brix to 10 °Brix have shown economic feasibility of RO. Water to the extent of 50 per cent can be removed by RO using about 1/10th of the energy that would have been required by a triple effect evaporator (21).

Maple sap concentration

The concentration of maple sap to maple syrup takes the advantage of the fact that RO plants are compact, can be portable and use electrical energy. The sap is being concentrated (to remove 75 per cent of water) in individual farm with a portable RO unit more economically and transported to a central evaporation plant. The concentrated sap is then converted to maple syrup by boiling in a kettle. The maple flavour precursor has been retained in the sap concentrate with later on boiling producing full flavour (22).

Table 5

Solute recovery of sugars and organic acids at 2.0 WCR

Treatment	Sugar recovery			Organic acids recovery	
	Sucrose (%)	Glucose (%)	Fructose (%)	Malic (%)	Citric (%)
6.21 MPa No Enz	99.7	99.5	98.4	86.5	83.2
6.21 MPa Enz	99.3	99.2	98.1	88.3	84.6
4.14 MPa No Enz	99.4	99.3	98.3	84.4	84.9

(Source: Medina & Caicia, 1988)

Table 7
Characteristics of feed, concentrate (retente) and permeate streams
of different fruit juices concentrated by reverse osmosis

Component		Orange	Grape fruit	Lemon
Brix (Degree)	Feed	11.98	8.68	7.70
	Conc.	25.26	25.06	22.52
	Perm.	0.0	0.0	0.0
Hexose (%)	Feed*	10.68	7.94	1.38
	Conc.	10.80	7.15	1.38
	Perm.	0.03	0.05	0.05
Acid (%)	Feed	0.89	0.90	4.60
	Conc.	1.86	2.66	13.30
	Perm	0.0	0.0	0.0
Vitamin C (mg/100 ml)	Feed	43.0	46.0	36.0
	Conc*	43.0	45.0	36.0
	Perm	0.0	0.0	0.0
Volatile oil (%) (as Limonene)	Feed	0.023	0.007	0.035
	Conc*	0.019	0.005	0.024
	Perm	0.0	0.0	0.0
Pectin (%)	Feed	0.033	0.022	0.05
	Conc*	0.022	0.026	0.05
	Perm	0.0	0.0	0.0
Pulp (% V/V)	Feed	10.0	7.0	9.0
	Conc*	8.0	5.0	8.0
Viscosity (CS at 30°C)	Feed	1.9	1.5	1.8
	Conc.	3.9	2.7	6.6

*Values measured after dilution to single strength (Feed)°B

(Source: Braddock et al. 1988)

Deacidification of fruit juices by electrodialysis

High acidity levels (1.0 to 1.2 per cent) in mandarin oranges, Bangalore Blue grapes and pineapple comes in the way of their utilisation as single strength or concentrate form. Among the various methods tried for deacidification, electrodialysis appears to be practicable. It has been found possible to bring down the acidity level of these juices to about 0.4 to 0.5 per cent by this technique without much affecting the nutritional and organoleptic qualities of juice (Table 8). The energy calculations have shown the requirement of 6 to 10 kwh of power per tonne of fruit juice to be treated and therefore the energy cost involved is insignificant (4).

Protein concentrates and isolates

UF is a promising techniques for the recovery of protein concentrates and isolates from cake of oilseeds like soya, groundnut, coconut, etc. At present in

India, acid coagulation technique is being used to obtain the isolates. UF has been found to yield 15 per cent more protein than acid coagulation (23). The protein obtained by UF had superior functional properties and had high chemical score (Table 9) due to better amino acid profile in the case of coconut protein isolate (e.g. Lysine content of coconut protein obtained by UF protein was 4.1 g/16 g N as against 3.3 g/16 g N in acid precipitated protein). Similarly, there is the potential for recovery of better quality protein from other oilseeds. In the production of the protein isolates by conventional process, filtration and centrifugation processes are laborious and time-consuming and this could be eliminated by UF process.

Table 8
Data on electrodialysis and its effects on important physico-chemical composition and organoleptic qualities of fruit juices.

Particulars	Feed Juice		Juice after ED		Juice after ED and recirculation	
	Pineapple	Orange	Pineapple	Orange	Pineapple (35 min)	Orange (60 min)
°Brix	15.5	9.0	14.5	7.5	13.5	7.0
Acidity [a citric/ tartaric (v/v)]	0.90	1.2	0.46	0.53	0.35	0.52
pH	3.4	3.2	2.8	2.7	3.2	3.0
Ascorbic acid mg%	24.8	46.5	16.0	23.6	14.5	20.8
Loss of ascorbic acid %	0.0	0.0	35.5	49.2	41.5	55.3
Loss of carotenoid pigment %	0.0	0.0	-	11.4	-	-
Loss of thiamine %	0.0	0.0	-	55.0	-	-
Retention of anthocyanin pigment %	-	-	-	-	-	-
Taste and flavour	Acid in taste	Slightly bitter	Slightly biting taste	Increased bitterness, flavour affected	Agreeable taste, flavour affected	Increased bitterness, flavour affected
ED stack: 15 cell pairs (all parallel)				Effective membrane area 80 cm ²		
Volume of Juice: 600 ml				Energy requirement 6.7 kwh/m ²		
Current efficiency: 75%						

(Source: Nanjundaswamy & Chikkappa, 1989)

Table 9
Essential amino acid contents (g/1,000 gm protein) and indices of coconut protein and hydrolysed products

Essential amino acid	FAO provisional pattern ¹)	Coconut kernel	Protein isolate (isoelectric p ¹)	Protein isolate (ultrafiltered)	Hydrolysed protein (isoelectric P ¹)	Hydrolysed protein (ultrafiltered)
Isoleucine	4.0	3.7	3.5	3.6	3.3	3.5
Leucine	7.0	7.0	7.0	8.9	7.2	9.1
Lysine	5.5	3.8*	3.3*	4.1*	3.5*	4.2
Methionine + cystine	3.5	4.2	4.4	4.6	4.3	4.4
Phenylalanine + tyrosine	6.0	7.7	7.2	7.8	7.5	8.0
Threonine	4.0	3.1	3.1	4.0	3.3	4.1
Tryptophan	1.0	1.3	0.9	1.0	0.9	1.0
Valine	5.0	5.5	5.2	5.8	5.1	5.6
Chemical score	-	69	60	75	64	76

*First limiting amino acid as determined by chemical analysis

¹ WHO, 1973

(Source Chakraborty, 1985).

Purification and concentration of food enzyme

Enzymes being heat sensitive large molecules are suitable for concentration and purification by membranes. In enzymes purification diafiltration (constant volume ultrafiltration) is the commonly used method. UF is finding increasing applications in the simultaneous purification and concentration of food enzymes like pectinases, alpha-amylase, cellulose, proteolytic enzymes (24) etc.

Egg white concentration

Egg white is useful for baking industry because it can support foams carrying large quantities of flour and sugar. UF and RO have been found to be useful for concentration of egg white (11.5 to 26.0 per cent solids) without browning reaction and with improved functional properties of the protein.

High fructose corn syrup production

The production of starch into high fructose corn syrup involves preparation of a paste from starch slurry, saccharification by amylase or glucoamylase and finally isomerisation of glucose to fructose by glucose isomerase. This will be followed by chromatographic separations to produce 90 per cent fructose. Membrane (UF) bioreactors are being tried with considerable success to produce high fructose corn syrup (25). Productivity of UF reactor is claimed to be ten times better than the batch reactor (25, 26).

Treatment of water

High potential application of UF and RO in our country can be used for production of pure water for use in soft drink and fruit juice drinks. Water produced by membrane process will be extremely pure and contains no bacteria, viruses and other particles. This technique can replace conventional (sand filters etc) method.

Treatment of process water in food industries

UF has been found to be an inexpensive and versatile alternative to conventional technique used to treat waste water in food processing industries (27). Since large quantities of water are being used in food processing industry and water is becoming a costly utility, there is scope for treating the waste water by UF to reduce BOD and COD and reusing it.

Concentration of coconut water

In coconut processing factories large volumes of water are available as by product. Fats and oil are first removed by centrifugation and the supernatant is passed through RO to obtain concentrate of 10 to 12 per cent sugar solids. This can further be evaporated to get 67 °Brix syrup and could be utilised in candy manufacture or as beverage base (28).

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STORAGE AND INFESTATION CONTROL

214 Ethylene fuels fruit ripening

Ethylene production is the driving force behind the fruit ripening process and not just one of the outcomes, according to researchers working at the Plant Gene Expression Centre at the University of California at Berkeley.

They observed that in tomatoes ripening was preceded by a rapid burst of respiration and an increase in the production of ethylene. To prove the cause effect relationship, the research team headed by Prof. Oeller treated tomato fruits with antisense RNA molecules that blocked the production of an enzyme, Ace Synthase, that produces 1-aminocyclopropane-1-carboxylic acid.

The procedure was effective in preventing ripening and when the fruits were exogenously treated with ethylene or propylene the inhibitory effect was reversed. The actual mode of action of ethylene as a plant hormone is still not fully understood. But the researchers believe that the use of antisense RNA for Ace synthase could prevent commercial losses due to the over-ripening of fruits and vegetables.

(Chemical Weekly 37(31), 1992, 109)

215 Studies on apple browning inhibition

The browning of fresh Granny Smith apple juice is almost 100% inhibited for 24 hours at room temperature by the addition of i, K or T-carrageenan alone or in combination with citric acid report researchers CBS Tong and K.B. Hicks. Browning is also inhibited by amylose sulfate or xylan sulfate.

Diced apple also does not brown with the addition of carrageenan and citric acid. Only the sulfated polysaccharides are effective in preventing browning. Sodium hexametaphosphate is ineffective.

(Chemical Weekly 37(30), 1992, 103)

216 Potato storage

Munters Ltd., have developed a way to humidify the air and reduce the evaporative weight loss from potato. This concept is currently being evaluated by the Potato Marketing Board.

The evaporative contact humidifier developed for this task by Munters of Blackstone Road, Huntingdon, Cambridgeshire, has already been used for many years in Scandinavia. The system is based on a natural method whereby

the evaporation of water is allowed to simultaneously generate humidity whilst cooling the surrounding air. Almost 100 per cent air humidity is achieved and input running costs are low.

Excessive weight loss in stored potatoes represents not only a loss of saleable weight but also a loss of quality. With the Munter system the environment approaches the equilibrium vapour pressure deficit, which means that weight loss is minimised.

(Food Trade Review September 1991, 504)

217 Storage Bin

The Indian Grain Storage Institute (IGSI) in Hyderabad, which has been grappling with the problem of storing grains with high moisture content for sometime, has come up with a storage bin that prevents spoilage of wet grains.

Storing and handling grains with a high moisture content, especially paddy, has been ticklish problem for Indian farmers. Valuable grain is lost as the several storing methods currently in use in different parts of the country do not adequately tackle the moisture problem.

The bin, which can be erected outdoors, costs Rs.17,000 and the operating cost is only about 12 paise per hour. Though the initial cost is high, virtually no maintenance is required.

The five-metric-ton-capacity bin uses natural air drying and solar energy to minimise losses during storage. The bin creates a better storage environment for grains through air convection, the process of water vapour diffusion from regions of higher relative humidity to lower.

It has undergone field trials in Andhra Pradesh and Shimoga district of Karnataka for storing high-moisture paddy. The results were good, with the grain not losing its lustre, no fungal damage and a yield of 70 per cent head rice is realised.

The bin, which can store wet grains upto two months, consists of two concentric cylinders, a solar reflector of two metres diameter and a blower. It dries the wet grain to the equilibrium moisture content level.

The system is designed to take upto five tonnes of paddy and attains the desired EMC within 15 days. It has weathered all storms and can provide for safe storage-cum-gradual drying of moist grains.

The bin can be erected anywhere in a courtyard, and is constructed on four masonry or steel pillars, about 2.5 metres high.

(*P.T.I. Science Service* 11(8), 1992, 2-3)

218 Additive in ice helps preserve fish

The North Atlantic Inc. USA has a regular programme of adding citric acid and potassium sorbate in equal amounts to the city water being fed into the ice-making machine. The resulting ice which contains 0.2% citric acid and 0.05% potassium sorbate, both food grade additives, is reported to keep the fish fresh.

The tests of whole fresh cod stored in treated ice, showed reduction in the bacterial load. A comparative study was made with the cod from the same tow stored in regular, untreated ice. Samples were taken four times over three day periods from the flesh of cod that originated in the same tow, but was held in four boxes, two with treated and two with untreated ice.

Both batches showed fish in treated ice had lower bacterial count on the 1st day of testing and on the 10th day of testing, the bacterial count in the treated batch was less than half that of the untreated batch.

The Food and Drug Administration, USA also has approved the use of ice containing the two food grade additives for whole fish.

The report shows that by using the treated ice the shelf life of the fresh fish can be extended beyond 10 days.

(*Seafood Export Journal* 24(3), 1992, 26)

219 Dehydration of fish on storage and its prevention

Unless the fish are wrapped or sealed in some way, continuous loss of moisture from fish takes place both during freezing and cold storage, resulting in a loss in weight. This phenomenon, mainly depends on two factors:

- (i) the ability of the air in the coldroom to accept more moisture; and
- (ii) the ease with which water is released from the surface of the fish.

Weight loss during freezing mainly depends on the type of operation, freezing time and type of product. Freezers such as plate freezers, where fish are frozen by contact and released by defrosting, will have negligible weight loss during freezing. Dehydration losses occur mainly in air blast freezers and in other freezers which use a stream of cold running gas, such as nitrogen or carbondioxide, to freeze the fish. Losses are around 1 per cent with air blast

freezers and a lot less with the latter types (around 0.5 per cent) by virtue of the fact that they have lower temperatures and shorter freezing times.

The rate of weight loss is proportional to the surface area exposed and hence the percentage weight loss from smaller fish with a relatively large surface area will be higher than that from larger fish which has a relatively low surface area.

Dehydration of fish during cold storage not only gives rise to a loss of saleable weight but also leads to deterioration of product quality such as a change in the texture of the flesh (freezer burn), development of rancidity, off-flavours and so on. Glazing, the application of a layer of ice to the surface of a frozen product by spraying water on it or by dipping the product in water, is widely used in the fish industry to protect the frozen product from the effects of dehydration, oxidation and other changes. It is a particularly useful and cheap method of protecting fish which are stored in bulk, retail packets, IQF fillets, cooked and peeled prawns and others.

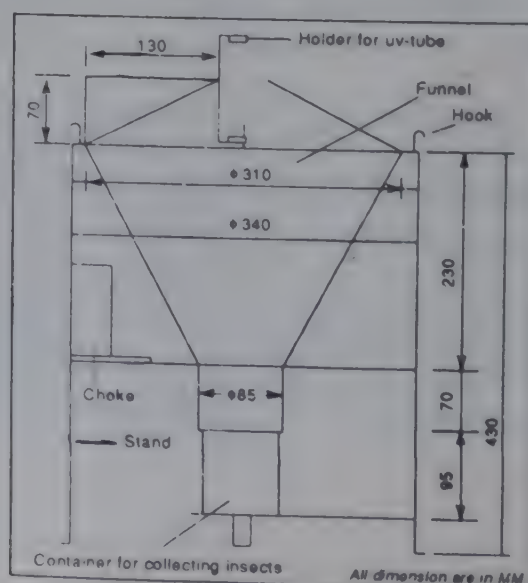
Glaze is often applied in an uncontrolled manner. However, such uncontrolled application may lead to complications when glaze has to be accounted for in selling weight. In the UK, for example, an upper limit of 15 per cent glaze is allowed for scallop whereas for prawns it is 10 per cent. To keep the product within these limits of glazing operator controlled or automated dipping or spraying systems are often used. For the preservation of large food fishes, however, dipping the frozen fish in water, spraying it with water would suffice to give it an adequate glaze. During periods of prolonged storage, it is important to reglaze the fish periodically.

(*Seafood Export Journal* 24(3), 1992, 28-29)

220

Ultraviolet light trap for godowns

The ultraviolet (UV) light trap consists of an ultra-violet source (four W



germicidal lamp). The lamp produce UV rays of 253 nanometres. The light is fitted at the centre of a funnel of 31 cm across at the top and 8.5 cm at the bottom.

The bottom of the funnel is attached to a transparent plastic container for collecting the trapped insects. To hang the unit three hooks have been provided at the periphery of the funnel. The unit is also provided with a tripod stand.

The light trap can be placed in foodgrain godowns about 1.5 m above the ground preferably near walls as it has been observed that the insect tend to move towards the walls during evening hours. The trap can be operated during night hours.

(The Hindu 24 June 1992, 24)

FOOD ADDITIVES

221

Onion oil for food uses

Oil researchers at the Oil Technology Research Institute (OTRI), in Anantapur have isolated oil from the common onion, with potential use in the food and pharmaceutical industries.

Through a special process, oil to the extent of 0.005 per cent is extracted from sliced bulbs of the onion. The oil has a characteristic pungency due to the presence of alkyl di-tri-sulophides, says Dr. G. Azeemuddin, Director of OTRI.

The researchers have also used a solvent extraction process using normal hexane to obtain oleoresin from the freshly cut onion bulbs. The yield from this method was 0.04 per cent. The oil is light brown and waxy with the typical pungent smell of fresh onion. Dr. Azeemuddin told PTI.

Dr. Azeemuddin said onion oil extracted from the bulbs could be used as a flavouring agent in meats, sausages, soups and table sauces.

Being rich in cepanone and neodecanoic acid, onion oil has potential use in the pharmaceutical industry, especially as a long-term prophylactic for patients with atherosclerosis, he added.

The major drawback in extraction of oil from onions is the rather low yield. Only in the case of the Russian variety, the oil yield is comparatively higher at 0.04-0.18 per cent, Dr. Azeemuddin said.

The production of onions has been varying widely, often creating a serious glut and steep fall in prices. For example in 1989, Maharashtra witnessed an unprecedented boom in onion production, resulting in a serious crash in prices, which forced the State Government to offer it free. In spite of these measures, the Government was compelled to destroy two million tonnes of onions worth Rs. 25 crores.

(Financial Express 1 July 1992, 5)

222

Lecithin products

The lecithin division of Riceland Foods Inc, USA, produces a full range of deoiled lecithin products for a variety of uses.

The Lecigran line, which contains a minimum of 97 per cent phosphatides to assure consistent quality, includes a powder of coarse grind, suitable for most applications, in which the particle size profile allows for easy handling and dry blending with other ingredients: a powder of fine grind, for applications requiring rapid dispersion, in which the greater surface to volume ratio assures homogeneity and optimum functionality in the finished product; a coarse grind powder containing 1 per cent flow agent to increase flowability; a granular lecithin used as a high quality dietary supplement; granules with 1 per cent flow agent added to enhance flowability: and a powder specially formulated for direct compression tableting.

Leciprime series fluid lecithins are described as uniform high quality products standardised for optimum performance. Soy phosphatides are naturally occurring compounds with interfacial tension-reducing properties. Available unbleached or single bleached, the products are generally recognised as safe (GRAS) multi-purpose food substances and can be labelled as lecithin. The products are packed in 55 gallon open head steel drums containing 450 lb of product. Bulk tank trucks are available too.

(Food Ingredients and Processing International January 1992, 28)

223

Pectin 'Fat' as a fat substitute

'Slendid' is the name of new fat replacer launched by Hercules, the US manufacturer of food ingredients. The new product is made from natural pectin derived from citrus peel, the first time pectin has been used in this way. It is supplied in powder form making it to work with, transport and store and it will have applications in low fat mayonnaise, yoghurts and products where a creamy, fatty mouth feel is desired.

Several US food companies have been working into Slendid in the past six months and Hercules expects Slendid containing products to be on the market by early 1992.

(*Chemical Weekly* 37(30), 1992 101)

PROCESSES

224 Process to remove cholesterol

About 95 per cent of the cholesterol is removed from butter, and a little less from milk and cream, by a process being developed at the University of California (Davis). The technique is relatively simple, according to Thomas Richardson, Professor of Dairy Food Science in the Department of Food Science and Technology.

Food-grade saponins are stirred into the product and form an insoluble complex with the cholesterol. The complex is then filtered out, using a filter aid such as diatomaceous earth. Richardson has tested the route on the 1-L scale and found that it could easily be upsized using conventional dairy equipment.

(*Research and Industry* 37(2), 1992, 125)

225 Low-Lactose milk

A new type of fresh milk developed to overcome milk reaction; in lactose intolerant adults and children has been launched by the Queensland Dairy Industry Authority (QDIA). To be marketed as 'Lacto Lo', the milk retains the look, taste and food value of regular milk with the lactose content reduced by 50%.

The new milk has been developed as a joint venture by the QDIA and Cottee Corporation, with assistance of the Atherton Tableland Co-operative Dairy Association Ltd.

Clinical research involving lactose-intolerant subjects, conducted at the University of Sydney showed that Lacto Lo overcame 'milk reaction' discomfort in most cases. The researchers used the breath hydrogen method to measure the effectiveness of Lacto Lo. The rise in breath hydrogen level, an indication of lactose intolerance, was reduced on average from a regular milk reading of 33.5 to 6.9 for Lacto Lo. Most of the lactose intolerant subjects in the study

were found to tolerate up to 300 ml or two glasses of Lacto Lo milk in one sitting without symptoms.

(Asia Pacific Tech Monitor Jan-Feb 1992, 19)

226 Butterfat powder

Twin Spires, the commercial arm of the Aberdeen and District Milk Marketing Board, has launched a butterfat powder -74 per cent dairy fat. The new product will be of particular interest to food technologists and flavourists who require a highly concentrated dairy fat in a powdered and easy to handle form. The product acts as a source of fat and as a whitening material in soup, sauce and seasoning applications.

(Food Ingredients and Processing International January 1992, 29)

227 Process technology for coconut cream

Scientists at the Regional Research Laboratory in Thiruvananthapuram have developed a process technology for the production of coconut cream, a value-added product from fresh coconuts.

The coconut cream could serve as substitute for fresh coconuts in places where fresh nuts are not readily available.

The composition of the canned cream is 23 per cent fat, 45 per cent protein, 5.5 per cent carbohydrate and 1.5 per cent minerals. The cream has a natural coconut flavour.

In the optimised process, well ripened fresh nuts are dehusked and aged for a week. After splitting they are deshelled and the kernels are immersed in hot water for blanching.

Subsequent to blanching the kernel size is reduced to gratings using a hammer mill which facilitates easy milk extraction. A screw press has been specially designed and fabricated for this purpose which has high efficiency for the extraction.

Additives are dispersed in the filtered milk before the milk is emulsified. In the emulsification process intimate mixing of the additives with the milk, uniform dispersion and size reduction of the fat globules take place to give the creamy consistency.

After pasteurisation, the cream is canned and subjected to exhausting, sealing and retorting techniques. This canned cream is ready for use.

The RRL which set up a demonstration plant at Cochin with a processing capacity of 1000 nuts per batch has released the technology to two private entrepreneurs for commercial production with capacities of 10,000 nuts per batch.

The cost of the plant and machinery is Rs.7.5 million. Test-marketing of the cream in Bombay, Delhi and Madras, has indicated that it is acceptable in households and in hotels.

(*P.T.I. Science Service 11(11), 1992, 2-3*)

228 Electronic device to disinfect water

Scientists at the Industrial Toxicological Research Centre in Lucknow have developed an electronic device that kills bacteria and viruses in drinking water.

The National Institute of Virology in Pune which tested this device says it destroys some six viruses including those that cause polio and hepatitis, and also the Rota virus that causes diarrhoea in children.

The device that can be fitted to a domestic water tap has been developed by Mr.M K Sehgal, Mr. O P Mishra and Dr. P K Ray.

According to Dr Ray, the system is so efficient it takes only 15 minutes to disinfect 10 litres of drinking water.

The device is an electronic instrument which passes alternate pulse currents of 100 to 400 milli Amperes between electrodes immersed in water. It is believed that oxygen liberated at the anode breaks the cell membranes of microorganisms, resulting in their destruction.

According to the Central Drug Research Institute (CDRI), the electronic device is preferable to boiling and chlorination processes that are slow, and cheaper than devices that produce ozone or ultraviolet radiation to disinfect water.

(*P.T.I. Science Service 11(12), 1992, 2-3*)

229 Thermoplastics from wheat

Japanese researchers have developed a method for producing highly biodecomposable thermoplastics from the proteins in wheat (gluten).

The new method jointly developed by the Hyogo Prefectural Industrial Technology Centre. Nagata Sangyo and Dr. Y. Yamashita of Kyoto Institute

of Technology adds glycerin and emulsified silicone oil to gluten, to impart thermoplastic nature and strength to it.

The researchers are planning to commercialise the process, considering that it can produce biodecomposable thermoplastics at a much lower cost than the microorganism-aided process.

The process is simple powdered gluten, after being mixed with glycerin, glycol, emulsified silicone oil and urea, is dried and then pressed under heat. Gliadin and glutenin, major components of gluten having bonded hydrogen and sulfur are solidified while dry.

These bonds, however, are weakened when exposed to water to form gaps, into which hydrophilic groups and hydrophobic molecules are introduced to impart thermoplasticity and strength to the gluten.

The treated gluten, after being dried, is pressed under a pressure of 150 kg per square metre into approximately 300 micrometres thick, semi-transparent sheets. It has been confirmed that these sheets are decomposed in four weeks when buried in soil.

The sulfur-free sheet is more resistant to decomposition, lasting an additional one to two weeks. The sheet containing glycerin and sulfur has a tensile strength of 250 kg per square centimetre, sufficient for use in shopping bags. However, increasing the quantity of urea working as the plasticizer, decreases the tensile strength.

(Rural Technology March 1992, 40-41)

230 Pharmaceutical proteins from potatoes

Scientists at Mogen International NV in Leiden. The Netherlands, have produced the pharmaceutical protein HSA (human serum albumin) in potato plants using recombinant DNA technology. This project is part of a feasibility study on the production of valuable compounds in plants, which is financially supported by the Dutch Ministry of Economic Affairs.

HSA is widely used for clinical purposes. At present, the pharmaceutical industry uses human blood plasma as a source of HSA. This production method is threatened by the potential risk of contamination with AIDS and hepatitis. Therefore, several laboratories are investigating alternative production methods, mainly in microorganisms such as bacteria or yeast that can be grown in large-scale fermenters. Compared to these methods, plants are a substantially cheaper source of protein.

Additional research will be necessary to find out the possibilities of large scale production and purification. This will be done in the joint research project with Avebe (the world's largest potato-starch processing company), in which the technical and logistic aspects of the production of valuable proteins in potatoes will be investigated.

(Asia Pacific Tech Monitor Jan-Feb 1992, 19-20)

231

Food grade phosphoric acid

Ballarpur Industries Ltd. (BILT), at Karwar in Karnataka, has recently succeeded in developing a process to make food grade phosphoric acid. So far no one is making this chemical in India which is used in softdrinks, medicines and refining of vegetable oil.

Technical grade phosphoric acid, although far more pure than the phosphoric acid made by the fertilizer plants, still contains certain impurities like fluorine, sulphates, arsenic and organic colouring matter which have to be removed before qualifying as food grade.

According to Dr. V.V.Sawant, Chief of R and D at BILT, the process developed at the Karwar plant uses chlorine dioxide to remove the colour and steam distillation to eliminate the fluorine. The arsenic is removed by solvent extraction or by converting it into arsenic hydride and then vapourising it. Unlike the conventional thermal process, no sulphide is used to remove the arsenic so that the final product of BILT has no offensive odour arising from traces of remaining sulphide.

The company has installed a 100 tonne per month pilot plant to establish its process. According to the General Manager, Mr. Saxena, Pepsi International has shown interest in buying the food grade phosphoric acid made by BILT. But, prior to this, the U.S. Food and Drug Administration has to qualitatively approve the product. BILT is now taking steps to obtain this approval.

(The Hindu 22 May 1992, 12)

BYPRODUCTS AND WASTE UTILIZATION

232

Decomposable plastic from food wastes

A process that converts starchy food wastes and byproducts into a lactic acid-based plastic that fully decomposes into harmless chemicals when exposed to moisture of sunlight might be commercially available soon.

Argonne National Laboratory in the United States has licensed key steps in its BioLac process to Kyowa Hakko USA Inc., the subsidiary of Japan's Kyowa Hakko, which deals with fermentation products.

Kyowa Hakko plans to carry out further research aimed at commercialisation. The BioLac plastic has potential applications for products such as compost bags, coatings for paper, seeds, pesticides and fertilisers.

It could also find use in mulch films for time-release of pesticides and fertilisers. In the two-steps that have been licensed, one converts glucose, found in starchy food wastes, into lactic acid, the other converts lactic acid into polylactic acid.

(P.T.I. Science Service 11(8), 1992, 11)

233

Coconut shells export

The coconut shell is no longer a begging bowl. It can be a money spinner in the export market as it has attracted attention in the West for use in packaging food items.

European countries like Germany, the Netherlands and Austria are in the process of enacting legislative measures to curb or minimise the visible waste and encourage bio-degradables and re-usable materials for packing food stuffs in place of synthetic packaging.

These regulations in the West would prompt the food industry to search for alternate materials for packaging.

This is the most favourable condition for India to promote exports of coconut shells.

A Spanish company has already arranged for the import of over 600,000 shells from three copra processing units in Kerala where 90 per cent of the coconut shell is produced. These shells would be used to serve ice creams in the Barcelona Olympic games.

According to the Coconut Development Board, more export enquiries are being received from Spain and Italy. The board expects the demand for the shell to grow which will boost the coconut-based industry in Kerala.

The shell which was hitherto underutilised is sure to find new uses as containers and receptacles throughout the world if planned market promotion initiatives are taken, said the Chief Coconut Development Officer, Mr. V.T. Markose.

(Financial Express 25 April 1992, 5)

234**Surgical sutures from fish**

Indian scientists have perfected a technique to produce high-grade surgical sutures from fish intestines, an abundant raw materials in the country.

Strong, fine sutures as long as 1.5 metres can be produced from inland water fish guts, report scientists at the Central Institute of Fisheries Technology (CIFT), Kochi.

The sutures cause no local irritation or allergic reaction and can be easily absorbed, according to Dr M.K. Mukundan, who headed the CIFT team.

- The government's green signal is awaited for using fish gut sutures in operations on humans in selected major hospitals.

(*Financial Express* 12 July 1992, 10)

EQUIPMENT AND MACHINERY**235****Small-scale processing of Cashew Nut**

A small-scale cashew nut decorticating machine developed by the Overseas Development Natural Resources Institute (ODNRI)'s Industrial Development Department is undergoing field testing in Zambia. The plant can process 100 kg of cashew nuts per hour. Waste shell is burned within the unit to give the nuts the initial roasting. This manner of burning waste shells saves fuel and minimizes the cashew nut shell liquid contamination level.

The equipment is of modular construction and the whole lot can be packaged in a container which could minimize shipping cost.

Further information is available from: Director, Overseas Development Natural Resources Institute, Central Ave., Chatham Maritime, Chatham, Kent MEA 4TB, U.K.

(*Asia Pacific Tech Monitor* Jan-Feb 1992, 20)

236**Mechanical tapioca chipper**

Tapioca (*Manihot esculenta*) is a root crop cultivated for use as food, animal feed and production of starch. The physiological deterioration of tapioca root is related to accumulation of scopoletin, leading to discolouration and deterioration after the harvest within a week.

This spoilage can be prevented by chipping and drying the tapioca tubers. At present, the tuber is sliced manually which is time-consuming and ineffi-

cient, besides causing drudgery. A vertical feed type motorised tapioca chipping machine has been developed by the Tamil Nadu Agricultural University, Coimbatore.

The tapioca chipper consists mainly of a feed-hopper with guides, chipping disc with three blades, chips outlet and a 0.5 hp single phase electric motor.

The feed-hopper is provided with vertical guides made of pipes of diameter 25 to 80 mm for 100 mm length to facilitate feedings of tubers of varying diameters. Through these guides the tubers reach the chipping disc which is rotating at 300 rpm. The radially mounted blades on the chipping disc slice the tuber and the chip is collected through the outlet.

The features of this unit are:

- tubers of any size can be fed;
- the thickness of chips can be up to six millimetre;
- no danger to the person operating the unit;
- suitable for making chips from other tuber crops such as raddish, carrot and potato;
- capacity of the unit is 275 kg per hour.

For details contact: R. Visvanathan or V.V. Sreenarayanan, Tamil Nadu Agricultural University, Coimbatore.

(The Hindu 5 August 1992, 24)

237

Sunflower seed oil press

The Bielenberg Sun flower Seed Oil Press (named after its designer, ATI engineer Carl Bielenberg) fills a market niche not addressed by larger, more complicated or more costly presses. It can be manufactured in small machine shops in developing countries and is affordable by village groups and small entrepreneurs. The equipment is a manually-operated ram-type press which exerts high pressure and has a continuous throughput. The press can be used without decorticating the seed, hence, additional preprocessing machines are not required. The press uses a hand-operated lever arm to move a piston back and forth inside a cylinder. The lever arm is about 2 m long and is connected to the end of the piston by two tie arms, one on each side of the press. As the operator pulls the lever down, the piston is pulled into a pressing cage by the tie arms. The sun flower seeds, fed into the cylinder from a hopper, are pushed into the pressing cage and compressed by the piston against an adjustable

restriction cone. The press can be mounted on a steel or wooden base to make it portable or on a cement base to make it more stable. The press usually is operated by two persons, although it can be operated even by one person only.

The press can efficiently extract oil from soft-hulled, oil-rich improved varieties of sunflower seeds. The seeds should be first spread out in the sun for 15-30 min to warm them up before processing. If used properly, the press can extract as much as 60-70% of the oil present in sunflower seeds.

In Tanzania and Zimbabwe, the press currently costs US\$ 350-500. Properly made presses are expected to last 5-10 years, depending on the frequency of use. The durability of the press is evidenced by the fact that presses manufactured four years ago, at the beginning of the project are still in use.

For further information contact: Nancy M Tresp, Publications Officer, A.T. International, 1331 H. Street, N.W., Washington D.C., U.S.A. 20005.
(*Asia Pacific Tech Monitor Jan-Feb 1992, 19*)

238 Groundnut Decorticator

One of the most labour consuming operations in groundnut is decortication (separation of kernels from the pods). This process consumes a lion's share of the cost of cultivation of groundnut.

With the hand operated groundnut decorticator, groundnut decortication has been made simple, easy and economical. This hand operated rocking-type groundnut decorticator consists of a sheet metal or a screen fixed on a semicircular frame.

There are seven rectangular cast iron bars with conical projections fixed to the sector which will be in contact with the pods while shelling. The rocking assembly is fixed in such a way so as to leave a decreasing clearance between the sieve and cast iron bars. The clearance diminishes the section from top ends of the unit to the bottom centre of the sieve.

This enables easy flow of pods when they are emptied after shelling. The entire unit is mounted on a stable frame which ceases collection of shelled pods from the bottom of the unit. Proper sieve can be chosen and fixed on to the machine depending upon the size of the pods and kernels. With a set of two sieves, 45 mm by 9 mm and 45 mm by 8 mm, all ruling varieties of groundnut can be decorticated.

When compared with the conventional method at the NPRC (National Pulses Research Centre) the hand operated groundnut decorticator was able

to shell 85 kg of groundnut pods in an hour employing four labourers (two for operating, one for feeding and one for collecting); while in the conventional method the four labourers were able to shell only 12 kg of pods in an hour.

For details contact: K. Srinivasan or K.S. Jehangir, National Pulses Research Centre, Vamban-622 303.

(*The Hindu* 6 May 1992, 20)

239**New machine ensures original flavour in canned fruits**

Sealed cans containing pineapple and other fruits in sugar syrup are earning a very good foreign exchange by exports. These sealed cans are cooked in hot water for some time to kill the micro organisms in the fruit and thus to preserve the fruit for a very long time. This cooking operation is generally being done in canning units in our country in batch type process in hot water retorts. In this process the contents are not uniformly heated and also retorts occupy considerable floor space. Continuously agitated cookers are not being made in the country and imported ones available are of high capacity such as 20,000 cans/hour costing lakhs of rupees.

A small scale Indian canner cannot afford to have these, firstly, because of its high cost and secondly, they are not in a position to feed so much work to these machines. So there was a strong felt need for the development of a lesser capacity machine costing less.

MERADO Development

A continuously agitated processing cooker with a capacity of 700 cans per hour handling A 2-1/2 size cans has been developed.

This machine contains a stator housing and a rotor. The stator housing contains tee section spirals fixed in the inside periphery. The rotor comprises of longitudinal angles. There is one inlet and one outlet port. The housing is half full with hot water. As the rotor rotates slowly, the cans are fed continuously in through the inlet port and is held in the gap in between the angles in the rotor. When the rotor rotates, the cans move axially due to the spiral guides in the stator and come out through the outlet part. The same principle is used in the cooler wherein cold water is substituted for hot water. As the cans are rolling continuously, the contents are agitated again and again resulting in better heat transfer and more uniform cooking.

Cans cooked in continuous cookers preserve longer and retain better flavour. Cooking time is also considerably reduced.

Specifications

Production rate	700 cans/hour
Overall size:	3 m x 2.8 m x 1.2 m
Can size	A 2-1/2 (4-1/16" dia x 4-11/16" ht)
Motor	1 HP, 750 RPM
Cooking time	15 minutes.

(CMC News 2(5), 1991)

240

Dehydration of fruits, flowers and vegetables

Tech-Know Consultants had developed a commercial plant to dehydrate horticulture products - flowers, fruits and vegetables at selective temperature between 27 C to 39 C, within 24 hours depending upon moisture content. This temperature range gives advantage over conventional higher temperature dehydration by way of better colour, aroma and rehydration characteristics. Power consumption is less than 9 units in 1 hour, for 500 kg input plant. Set up requires 3 phase, 415/440 V 12 HP connection. Water removal capacity is around 300 kg/24 hours. Space required is 15' L x 6' W x 12' H. Desired level of automation can be provided for the unit to operate. Additional advantage being, moisture removed is collected as distilled water quality (nearly). Smaller units can be designed for 50-100 kg input material.

For more details write to: Tech-Know Consultants, 3 Anantchhaya, R B Mehta Marg, Bombay 400 077.

(Chemical Products Finder 10(10), 1992, 136)

241

Vegetable Dryer

Rousselet and Cie in France have developed an automatic spin dryer for fragile foods. It will handle up to 700 kg per hour of salad material or up to 1200 kg of raw vegetables.

The stainless steel RCPC 60 Vx incorporates an automatic unloading system so as to achieve these outputs. The procedure is simple, as food is loaded in through a funnel in the lid, the machine rotates slowly so that it falls gently and evenly into the basket. Once the basket is full, the dryer switches automatically to a higher preselected speed and runs for a preselected length of time. At the end of the time sequence, the unit resumes its slow speed and a pusher plate rises to the top of the basket to unload dry product through the

side on to a conveyor belt. This unit features many different programmes to suit requirements.

For further information contact: Rousselet UK of Suite 1, Waterdene House, Water Lane, Leighton Buzzard, Bedfordshire.

(Food Trade Review September 1991, 508)

242 Vegetable dehydrator

The dehydrator developed at the Central Institute of Agricultural Engineering (CIAE), Bhopal, basically consists of a drying chamber, a plenum chamber, a heating chamber and a blowing unit. The drying chamber has 20 trays made of nylon wire mesh for laying out the product to be dried. The vegetables are 'prepared' by washing, peeling and cutting or slicing. The prepared material is blanched and sulphited if required, and spread over the drying trays. It is dried by switching on a blower and a heater for 11-14 hours. The total cost of production of the dehydrator is around Rs 12,000 and the cost of the operation works out to a mere Rs. 1.20 per kg of raw material.

(Documentation Bulletin No. 86, 1992, 8)

243 Fluidised bed dryer

A city-based engineering company has introduced a high output and energy efficient fluidised bed dryer for the tea industry in technical collaboration with a UK firm.

The dryer which works on the fluidised bed principle gradually reduces the moisture content in tea leaves after fermentation from 70 to 2.5 per cent in a two or three stage process, while preserving characteristics of high quality tea like bloom, liquor, flavour and briskness, a company spokesman told newsmen in Pune on Friday.

The firm will now be able to offer turnkey systems including centralised energy efficient heating equipment fired on wood, coal, lignite, oil or gas along with the standard range of tea dryers, he said.

(Financial Express 16 May 1992, 1)

244 Dense phase conveyors for milk powder

Scorpio Engineering offers dense phase conveyors for granulated and agglomerated powders used in the food industry (coffee and milk powder). The conveyors transport the material gently. This does not affect the solubility of

the materials in liquids like milk, water, etc. The system supplied conveys 4.5 tonnes of milk powder over 100 metres distance. The material is directly transported from storage silo to packing section. The dual pulse air knife dense phase pneumatic conveying system for granules do not break during pneumatic transport.

For more details write to: Scorpio Engineering Pvt. Ltd., 132 Wheeler Road, Cox Town, Bangalore 560 005.

(Chemical Products Finder 10(12), 1992, 118)

245 Food grade waterproof coating

Polydee-11, from Greensboro Polychem Ltd is a clear, two component system used in waterproofing and corrosion resistant coating. Used in drinking water tanks and for coating in food and pharmaceuticals industries. It can be given any desired colour.

For further information write to: Greensboro Polychem Pvt Ltd, 199, Defence Colony Fly-over Commercial Complex, New Delhi 110 024.

(Industrial Products Finder 20(7), 1992, 9)

246 Robot fruit inspector

Developed by the National Institute for Agricultural Research (Inra) and the Fruit and Vegetable Federation Research Centre, Penelaup (Programmable automatic electronic crushmeter) is a precision robot for carrying out firmness and crush tests on fruit and vegetables.

The robot can conduct a large number of tests: it can work on a wide variety of products from the gooseberry to the melon. Penelaup is used to make physical measurements in order to quantify certain parameters hitherto difficult to control: firmness related to variety, the effect of a particular treatment on the firmness of a product, the burst resistance of certain fruits such as grapes post-storage inspection, etc.

The user can programme the system in terms of speed, applied force and distance, making it a valuable tool for laboratories developing firmness tests and for quality control organisation.

(Deccan Herald 20 July 1992, VIII)

247**Firmer fruits with damage detectors**

Engineers at the Scottish Centre of Agricultural Engineering have tackled the problem of damage of produce by developing devices which record the forces involved in the handling process.

One device, the submersible Detective, is ideal for the produce washing area: every impact during the process is monitored and the maximum value is stored. Another detector, the Pinpoint Detective, has the added facility of recording the time of the largest impact, thereby identifying the exact spot of major damage.

Besides being damaged by heavy impact, tomatoes and other fragile produce are also susceptible to accumulations of small impacts. The Accumulating Detective records all the impacts above a desired level and totals them as the item passes through the system. All the devices, formerly known as "electronic vegetables", have force-sensitive inner skins. The micro-electronics contained within the devices process and store a record of impacts. (*Asia Pacific Food Industry* March 1992, 67)

248**Juice extractor with seed collector**

United Engineers introduces a triple action Juice Extractor with Seed Collector. It extracts juices, separates pulps and collects seeds in one action. It is suitable for extracting the juices of citrus and non-citrus fruits and vegetables. The juice-extractor is provided with a stainless steel mesh and motor fitted with thrust bearing, of capacity 400 watts and speed from 14,000 to 16,000 RPM. Three-speed piano type switch with inching facility and auto cutout switch are provided. Can extract more than 60% of the juice.

For more details write to: United Engineers (India), Milap Nagar, Hissar Road, Ambala City, Haryana 134 002.

(*Chemical Products Finder* 10(10), 1992, 105)

249**Fruit juice clarification**

The Bucher/Abcor ultrafiltration system for the clarification of fruit juices is a membrane filtering process that separates substances such as starch, proteins and enzymes. The system follows three steps of ultrafiltration. Permeation, where a portion of the liquid passes through the membrane; retention, where unwanted portions of the liquid are prevented from passing through the membrane; and flux, usually expressed in liter, square meter and

hour, that represents separation performance based on parameters such as temperature, viscosity, pressure, tendency of membrane to form a surface layer, effects of time, operating conditions and turbulence.

The diafiltration offers continuous dilution of retentate with water towards the end of the filtration cycle, and can obtain juice yields of up to 99%.

For details contact: Bucher Engineering GmbH, A-2331, Vosendorf, Austria.

(Food Engineering Int'l., June 1992, 81)

250

Leak-proof beverage caps

Leak-proof beverage caps with applications in beer, soft drink and edible oil bottles have been introduced by L and T. Designated Freshtops, the beverage caps completely seal the product from atmospheric contamination, preventing loss of fizz in soft drinks, flatness in beer, and rancidity in edible oils. The high viscosity plastisol is used in cellular gasket, increases resilience and ensures effective sealing of the bottle from the top as well as the sides. The Freshtops can be opened with a single twist, leaving no sharp edges; and eliminate problems linked with closures using separate liners, eg. poor adhesion, dust and dirt. In edible oil sealing Freshtop obviates the need of adding anti-oxidants. The caps are made of aluminium alloy.

For more details write to: Larsen and Toubro Limited, Packaging Division, Powai Works, Saki Vihar Road, Bombay 400 072.

(Chemical Products Finder 10(12), 1992, 39)

251

Pouch packing machine

MOI Engg Ltd has introduced a range of Horizontal Flow-Wrappers made in collaboration with Alphapack of Italy. These machines are designed for product packaging applications in confectionery industry (snacks, cakes, biscuits, (pre-wrapped and bare on edge; sweets) and in food industry (bread, sandwiches, cheese, fruits, frozen foods, containers and disposables); Model AP-400 is a high speed flow-wrapper suitable for speeds up to 200 packs per minute with a film speed up to 20 metres per minute. Features include: print registration system; machine stop with open jaws and fin sealers; gas flushing device, pneumatic gusseting device; sealing systems for BOPP, polyethylene and other heat sealable films; on-edge feeding for bare biscuits without inner wrap; product presence check; electronic piece counter; electronic machine speed counter, and double film reel holders with automatic reel changer.

For further information write to: MOI Engineering Ltd., A-7 Industrial Estate, S A S Nagar, Near Chandigarh, Punjab 160 051.
(*Industrial Products Finder* 20(5), 1992, 232)

252**Plastic food storage set**

Food service establishments and consumers can store food in the attractive, seven-piece Lamarle Air Tight Container Set. Made of see through, impact-resistant plastic approved by the US Food and Drug Administration, the containers fit compactly inside one another for convenient storage. Features include air- and water-tight seal, patented date-set for keeping track of storage time, and easy to clean interiors. This competitively priced set can go from freezer to microwave and from the table to the dishwasher's top rack.

For further information write to: Flynn-Lamarie Inc., 825 Van Ness Ave, San Francisco, CA 94109, U.S.A.

(*Industrial Products Finder* 20(6), 1992, 144)

253**Biscuit overwrapping system**

Bhullar Machines now offers a Biscuit Overwrapping System GW-609, synthesised from well proven machine systems to suit latest trends in packaging materials and pack presentation. It is thoroughly value engineered for sophistication to enable even the small customer to modernize packaging styles. Features: single wrap of rectangular, round and square biscuits on edge; heat sealable materials such as polypropylene, cellulose film, paper and laminates are handled; over 100 packages/minute output; highest efficiency in 3 shift operation; variation of up to + 6 mm acceptable on pack length and + 2 mm on biscuit size; electronic product registration; no film-product return, preventing product jam; low maintenance; easy size change; and optional equipment available, like no product no film feed, and programmable logic control for high efficiency. For further information write to: Bhullar Machines Pvt. Ltd., 144 Industrial Area, Phase-II, Chandigarh 160 002.

(*Industrial Products Finder* 20(6), 1992, 138)

254**Machine washes carcasses automatically**

The Final Carcass Wash cleans and washes all red meat carcasses automatically during the slaughtering process. It consists of a free standing, stainless steel cabinet, high pressure pumping system, and oscillating wash mechanism. This automatic machine increases the shelf life of carcasses,

improves product yield due to less trim, and reduces labour costs. It also cuts water and sewage costs because its water use is minimal.

For further information write to: Chad Co., Inc., 11531 W 83rd Terrace, Lenexa, Kansas 66214, U.S.A.

(*Industrial Products Finder*, 20(8), 1992, 57)

255

Automatic kebab machine

The French, famed for the care and attention with which they prepare their food, have developed an automatic kebab machine. Produced by Nijal, a company based in Baud, the machine can churn out 7500 kebabs, each weighing 100 grams, every hour, or one every 0.48 seconds.

The machine can take any kind of meat-beef, pork, chicken or fish - and compresses it into a mould in the shape of an array of cubes. It then pushes long skewers through the mould along each row of cubes. The skewers are then cut into standard kebab lengths and the moulds are removed and returned to the beginning of the line. The whole process is controlled by computer.

(*New Scientist* 9 May 1992, 20)

256

Grape precooling van

The Bombay-based Procon Engineers and Consultants which offers consultancy, supply, erection and commissioning of dairy, food, fruit and vegetable processing plants has developed the country's first grape precooling van. The concept of the grape precooling van is that grapes, if cooled down immediately after plucking to 0 C and stored at low temperature between 0 C and 4 C can be preserved without any qualitative damage for around three to six months. Procon Engineers' precooling van is basically an insulated and refrigerated body mounted on a tractor trolley. The dimensions are 5 mtr x 2 mtr x 2.5 mtr height. Insulation is 70 mm thick 'PUF' (polyurethane foam). The completely indigenous system which comprises a compressor, a motor, a condensor and an air handling unit has a capacity of 1,750 kg (350 cartons x 5 kg each). Precooling of grapes in packed condition from 37 C to 0 C takes ten to 12 hours at a cost of only four paise per kilo of grapes. Though the van has been specially developed for the benefit of grape growers, it can also be used for other fruits and vegetables. The benefits of precooling include increased shelf-life, exports to distant places possible, reduced losses of produce and fetches a good price for farmers per kg nett.

According to Mr. Arun Patil, proprietor of Procon Engineers and an M Tech in Dairy and Food Engineering from IIT, Kharagpur, an experiment was conducted at Pimpalgaon (Baswant) in Nashik district where grapes were preserved in a precooling van for 78 days in farm-fresh condition.

Further information can be had from: Procon Engineers and Consultants, B6/10 Dudhsagar, Ciba Road, Goregaon (East), Bombay 400 063
(*Chemical Products Finder* 10(10), 1992, 148)

PACKAGING

257 Apple baskets from bamboo ply

The Kerala State Bamboo Corporation plans to diversify into the field of apple basket manufacture using bamboo ply - plywood made of bamboo mats.

Speaking at a function to mark the inauguration of the food assistance scheme to reed cutters of the Corporation at Angamaly near here on Saturday, Corporation Chairman, Mr. G. Mukundan, said the Indian Plywood Research Institute had certified bamboo ply as one of the best substitutes for wood used in making apple baskets, which were in great demand in India.

(*Financial Express* 3 May 1992, 14)

258 Food containers

An unconventional technology that imparts a high oxygen barrier to blow-moulded plastic food containers and other rigid packagings has been developed by Japanese company Tayo Seikan Kaisha. Conventional methods to keep food fresh use suitable polymers in the core of multilayer containers as a physical barrier to prevent permeation by incoming oxygen. The Yokohama-based company instead uses an additive in the container's core layer to create a chemical barrier which works by trapping incoming oxygen.

The new technology, called oxyguard, is especially suited for use in restorable food items and small-sized bottles and injection-moulded closure applications. Ethylene-vinyl alcohol and polyvinylidene chloride are the two polymers now widely used as physical barriers in rigid packaging. The Japanese company on the other hand uses iron-based additives.

(*Business World* 1-14 July 1992, 103)

259**Bottle closure**

Oriental Containers has launched a novel bottle closure called "Aluseal" which does away with the need to use a bottle opener. The caps are opened by a simple peeling off process.

The German plant to manufacture these caps has an installed capacity to manufacture 400 million pieces a year. Mohan Meakins has been the first customer to use this type of closure on an all-India basis for its "Gold Coin" apple juice. The initial customer response ranged from "it is so easy to open" to "I would like to open another bottle", according to the company.

Oriental is also exporting these closures and it has orders of 40 million caps in hand, according to a company spokesman. Made of aluminium, Aluseal is suitable for all re-usable and throwaway glass and plastic bottles. Once opened, it cannot be resealed. This prevents adulteration or pilferage contents. It can be used for carbonated, non-carbonated beverages and milk products.

An inner PVC sealing material effectively seals bottles with wider tolerances, with the result that even recycled bottles can be sealed without leakages, according to the company. Sealing is done with minimum pressure, thereby reducing breakages.

(The Economic Times 8 May 1992, 6)

ANALYSIS**260****Soft drinks analyser**

Unicam's new soft drinks analyser provides fast, accurate determinations of soft drink components in both finished products and syrups. It allows components including colourings and sweeteners to be quantified to ppm levels and will identify the presence of particular flavourings.

Sample preparation is minimal, and up to ten components - including aspartame, caffeine, saccharine and sodium benzoate - can be determined in less than a minute.

Hard copy reporting options range from simple data printouts to customer-formatted certificates of conformity.

(Food Ingredients and Processing March 1992, 26)

261**Water analysis system**

The Aquatec system from Tecator determines NH_4^+ , NO_3^- , NO_2^- , PO_4^{3-} and Cl^- levels in water. This system can get the results of 50 samples in under an hour, or individual results in 40-70 seconds. The start-up and shut-down time is 15 minutes. It is able to switch analysis methods by exchanging the Method Cassette.

The Aquatec consists of the following: an analyzer with Method Cassettes; a Sampler; and a Data Handling System.

For details contact: Tecator AB, Box 70, S-263 21 Hoganas, Sweden.
(*Food Engineering Int'l.*, June 1992, 81)

262**Rapid mould detection**

Detection of *Aspergillus* and *Penicillium* species in food products can be rapidly undertaken using the Aspen mould latex agglutination kit from Tech-Gen International.

Using the principles of latex agglutination a result can be obtained in less than 15 minutes, even using heat processed food materials.

Developed by Holland Biotechnology BV, the method incorporates latex particles sensitised with anti-extracellular polysaccharide (EPS) immunoglobulins. When these particles come into contact with EPS antigen, as produced both by *Aspergillus* and *Penicillium*, a complex is formed which is registered as a positive agglutination reaction.

A control system based on the use of a second non-specific immunoglobulin easily detects false positive results.

(*Food Ingredients and Processing International*, January 1992, 32)

263**New system to identify contaminants in food**

The Dairy Research Laboratory of the CSIRO Food Processing branch at Highett, Victoria has developed a gas chromatograph/mass spectrometer/data system which can identify either desirable or undesirable flavours in foods and packaging materials. The system is advanced enough to quantify a component at the picogram (10^{-12} g) level, which means that it is sensitive enough to deal with taints whose flavour thresholds may be as low as .03 ppb or even less. Flavour threshold is the lowest concentration at which a component can still be tasted or smelt.

One of the recurring problems in the food industry has been the incidence of contamination with chlorophenols or chloroanisoles or both. The presence of chlorophenols can originate not only from the timber used in making the paper, but also from the pallets on which the sacks are stored or the floor of the container. Sometimes, even the glue used to make the sacks may have been preserved with chlorophenols. The source of contamination can be deduced by examining either the contents of the glueline or the contents of the sack.

The source of contamination is not limited to wood preservatives. Chlorophenols are readily formed by the action of chlorine-containing cleaners such as hypochlorite on phenolic compounds, and possibly from tannins or lignins, such as might be found in boiler water or in dams.

The Dairy Research Laboratory has also developed specialist knowledge in another area, that of a plastic, paint-like odour in a product. Analysis of some of the gas above the product may prove that the taint is due to pentadiene which is caused by microbial action on sorbic acid. Sorbic acid is permitted for use against fungi in a wide range of products.

Very often, the compound responsible for the off-colour is only a minor component of one of the many chromatographic peaks. In such a case, it helps if the odour can be identified by reference to the library of odours in the scientist's memory. The scientist can then search for this compound amongst the possibly hundreds of irrelevant compounds which the system has identified.

The gas chromatograph/mass spectrometer system is also in use in a CSIRO research investigation into the reasons for the lower levels of flavour in low-fat cheese and into the special compound responsible for the characteristic flavour of Cheddar cheese.

(Asia Pacific Food Industry March 1992, 62)

264

Moisture tester

The moisture tester is a microprocessor based instrument for measuring the moisture contents of powders, flakes, granules, and pellets instantly. Because of the non-destructive method of measurement, the sample can be mixed back with the bulk. As no sample preparation is involved, the time required for testing is short. A fixed weight of the sample is taken in the sample container (approx. 400 cc provided) and inserted into the test cell. Just pressing of a button gives the percentage moisture content which is displayed

on the front panel. Applications include: pharmaceuticals, dehydrated foods, seeds, chemicals, snack foods, tea, milk powder, yeast, biscuits, breweries, barley, meat, etc. For more details write to: Pam Pharmaceutical and Allied Machinery Co Pvt. Ltd., 127 Govt. Industrial Estate, Kandivili (West), Bombay 400 067.

(Chemical Products Finder 10(11), 1992, 46)

265

Potato hydrometer

The zeal potato hydrometer provides an accurate and simple-to-use method of measuring the solid content or percentage dry matter in potatoes, thus indicating their suitability for conversion into crisps, chips or powdered potato products.

The instrument comprises a transparent acrylic tube hydrometer with a plastic float, a hook and a basket containing a removeable 3 kg counterpoise weight which are floated in water and calibrated before the weight is replaced with an equivalent weight of potato. Density is indicated in g/ml and percentage dry weight, which allows determination of the solid content.

(Food Ingredients and Processing March 1992, 26)

COMMERCIAL INTELLIGENCE

PRODUCTION (RAW MATERIALS)

266

Milk output

The milk production in the country, which has maintained an upward, trend from the Seventh Plan period was estimated to be 53.7 million tonnes during 1990-91 and is, in fact, expected to reach the level of 56.4 million tonnes during 1991-92. This was revealed in the Annual Report of the Department of Animal Husbandry and Dairying for the year 1991-92.

During the Seventh Plan period, egg and broiler production registered a compound growth rate of 7.3 per cent and 18 per cent respectively. The annual egg production is estimated to have reached the level of 22 billion during 1991-92 as against the production of 21.1 billion eggs during 1990-91. As a result of Government's efforts, strains of birds with high egg productivity and meat-type birds have been developed in the country and dependance on imported grand parent stock has been minimised.

(Economic and Commercial News, 31(9), 1992, 11)

267

Potato production

India, with its total potato production of 15.1 million tonnes, is ranked fifth in the world. According to Central Potato Research Institute (CPRI) Director J.S. Grewal, India with 0.96 million hectares under potato cultivation ranked fourth in the world. The average yield of potato in the country was 15.8 tonnes per hectare.

(*Deccan Herald*, 13 June 1992, 10)

268

GRAPES PRODUCTION (1991)**BRAKEUP OF CONSUMPTION**

TOTAL PRODUCTION (In metric tonne)
9, 75,000

NORTH INDIA

Seedless production
1,00,000.

SOUTH INDIA

Seeded + Seedless production
8,75,000

**LOCAL
CONSUMPTION**

Seeded
5,00,000

Seedless
3,75,000

Local & domestic
market consumption

Domestic market	3,22,000
Export market	4,000
juice making	2,000
Wine making	2,000
Raisin making	45,000

(*Grape News of India* April 1992, 3)

269

Production of food and other commodities

Oilseeds production during 1990-91 touched a record level of 18.46 million tonnes with rapeseed, mustard, sunflower and soyabean having reached new peaks of production.

Despite erratic monsoons, foodgrain production in 1991-92 is expected to exceed 170 million tonnes as against a target of 182.5 million tonnes. Sugar-cane production is estimated at 235-240 million tonnes against the target of 230 million tonnes.

According to the Annual Report, fish production during 1991-92 is expected to touch an all-time high of four million tonnes, recording a five-fold increase over the last four decades. There has been a quantum jump in the export of marine products from the level of Rs.8940 million in 1990-91 to Rs.15,000 million in 1991-92 accounting for a spectacular increase of about 68 per cent.

Simiarly, the production of fruit and vegetables has been estimated to be 28 million and 57.8 million tonnes respectively during the year while the production of spices went up to an all-time high of around 2.08 million tonnes. Coconut poduction recorded 9700 million nuts during the year, cashew 294,000 tonnes and arecanut 268,000 tonnes. Production of pulses has increased from 10.96 million tonnes during 1987-88 to 14.07 million tonnes in 1990-91. Production during 1991-92 is targetted at 15.5 million tonnes.

(*Economic and Commercial News*, 31(9), 1992, 5-6)

PRODUCTION (INDUSTRIAL)

270

Production of food & fermentation products

Product	Quantity in	No. of units	Installed Capacity	Production	
				1989	1990
1. Milk powder of all kinds	Tonnes	47	177178.00	74535.00	90197.00
2. Wheat flour/maida	Th.tonnes	141	-	4701.00	4703
3. Gaur gum	Tonnes	8	50700.00	16407.00	13306.00
4. Biscuits	Tonnes	35	158175.00	164137.00	184247.00
5. Malted food	Tonnes	6	11280.00	4469.00	15138.00
6. Chocolate	Tonnes	9	12959.00	9240.00	10321.00
7. Beer	K. litre.	30	-	208499.00	219878.00
8. Soft drink & soda	M. bottles	32	1614.63	732.06	536.57

(*DGTD Report 1990*, 41)

271

Indian tea production and demand

Year	Exports	Internal consumption	Total Demand	(Million kgs.)
				Crop
1989	204	480	684	684
1990	200	500	700	714
1991	200	520	720	740

(*The Planters' Chronicle* April, 1992, 196)

EXPORT

272

Export target for rice

In a bid to push up the export of rice, the commerce ministry plans to generate a turnover of Rs.800 crore from this item during the current year. It has set an export target of eight lakh tonnes of rice for 1992-93.

In fact, the commerce ministry's proposal to export five lakh tonne of rice is now pending before the Cabinet Committee on Economic Affairs (CCEA), which is expected to give its decision soon. The target may be raised subject to the size of the total crop in the current year.

The ministry, following a CCEA approval during last year, had exported about 5.5 lakh tonne out of a total target of eight lakh tonne in 1991-92. The remaining 2.5 lakh tonne would be exported in the current year.

Sources say that the country has great potential to export about one million tonne of rice in the current year. However, the export of rice has become a sensitive issue. Even though, the consumption of high quality non-basmati rice is restricted to a limited and high-income section of the society, there is a strong opposition to export this item, it is argued. Consequently, the CCEA will fix the final target in accordance with the total demand and availability of both basmati and high-quality non-basmati varieties of rice.

The ministry has dropped all its plans to export wheat in the current year. However, about 50,000 tonne would be exported because of the commitments made by the Minerals and Metals Trading Corporation (MMTC) to some foreign countries. Besides, the potential for the export of sugar appears to be bright in the current year, say sources.

(*The Economic Times* 18 April 1992, 4)

273**Scope for onion, potato export from N-region**

The study undertaken by the Agribusiness Committee of the PHD Chamber of Commerce and Industry (PHDCCI) has said that there was tremendous scope for export of onion and potato from the northern region.

According to a PHDCCI news release, this could be achieved if adequate storage capacity was created, remunerative prices were assured to the farmers and the minimum export price was fixed.

The Chairman of the Committee, Mr. Lalit Khaitan, suggested the introduction of market intervention schemes in consultation with the States and farmers organisations to purchase onion and potato. This could result in a two-fold growth of exports in three years.

The release said there was a need to emphasise potato production for canning, dehydration and starch. As far as tomato production was concerned, Mr. Khaitan said Punjab, Haryana, UP and Himachal Pradesh had taken the lead in growing hybrid tomatoes.

(Financial Express, 24 April 1992, 3)

274**Record onion export by Nafed**

Nafed has created a record in the export of onions in 1991-92 earning Rs.183.23 crores by exporting 4,16,000 tonnes of onions as against 2.89 lakh tonnes in the previous year.

Nafed, which is the canalising agency for exports of onions, achieved this feat by lowering the minimum export price (MEP) in a bid to oust the competitors. Pakistan and Iran, in the world Onion trade.

The Chairman of Nafed (National Agricultural Co-operative Marketing Federation of India Ltd.). Mr. J.V. Shah told reporters that the federation planned to earn foreign exchange worth Rs.200 crore through onion exports in the current year.

He said that during 1991-92. Nafed also achieved a record turnover of Rs. 480 crores as against Rs.385 crores in 1990-91 thereby registering an increase of nearly 25 per cent.

(Deccan Herald, 3 June 1992, 13)

275

Seafood export earnings

India's export earnings from seafood registered an increase of 53 per cent in terms of value and 24 per cent in terms of quantity in 1991-92 as compared to the previous year, according to the Marine Products Export Development Authority (MPEDA) chairman C.T. Sukumaran.

The provisional figures of the earnings during 1991-92 was fixed at Rs.1375 crore as against Rs.893.37 crores earned in 1990-91 the final figure would be upwards of Rs.1400 crore, he said.

Japan accounted for the largest intake of Indian seafood, totalling 44,928 tonnes valued at Rs.687.50 crore during the period, this was followed by the USA with 21,254 tonnes valued at Rs.144.10 crore.

(The Economic Times 8 May 1992, 22)

276

India to resume meat exports to Egypt

The export of frozen meat to Egypt is likely to be resumed shortly, following the removal of a ban on the exports.

This was the outcome of the visit to Egypt and U.A.E. of an Indian delegation led by the Deputy Commerce Minister, Mr. Salman Khurshid.

Egypt has offered to supply crude oil, petroleum products, rock phosphate, petroleum coke, metallurgical coke, urea and cotton. It has expressed keenness to import apart from frozen meat, alumina, chemicals and pharmaceuticals, electronic and engineering goods from India.

The visit of the Indian delegation was mainly aimed at increasing bilateral trade relations as also India's share in the markets of Egypt and the United Arab Emirates (UAE).

It was resolved that the trade between India and Egypt which was in the region of about \$125 million during the current year should be raised to \$ 250 million during 1992-93 as part of the understanding reached during the visit of the External Affairs Minister to Egypt.

On the UAE side, good response was shown to India's suggestion that both trade and investment cooperation should be enhanced. In this context, the Chamber of Commerce and the Ministry of Commerce have reiterated their acceptance of a proposal that a business delegation from UAE visit India. It is hoped that this would be possible in the next few months.

In addition, both the Chamber of Commerce and Ministry of Commerce were quite responsive to the suggestion of a joint business cooperation committee to be set up between Dubai and the Abu Dhabi Chambers of Commerce and FICCI.

The issue of setting up a warehouse facility for Indian goods to be distributed in West Asia as well as for re-shipment to Europe and the US also received very enthusiastic response.

The delegation also visited Jabel Ali free trade zone to have a first-hand knowledge of the facilities being provided by the industries in the zone. The Minister hoped that many Indian companies would take advantage of the facilities available in the zone. It was agreed that India would promote establishment of joint ventures in UAE.

(Economic and Commercial News 31(12), 1992, 5-6)

277

Export prospects of Rajasthan spices under study

Spices Board of India has taken samples of select spices grown in Rajasthan to establish their oil content and quality, and to study their export prospects.

The board has collected samples of Fenell (Saunf), Coriander (Dhania) and Zeera and sent them to their laboratory for detailed analysis.

The director of horticulture Dr. Udai Bhan Singh said the report of the analysis will help the state to improve the quality of the spices grown in the state.

If the oil content was found to be sufficient, setting up of oil extraction plants would also be considered, he said.

(The Economic Times 22 June 1992, 11)

278

Export of spices in 1991-92

The export of spices from the country during 1991-92 touched an all time high mark of 130,567 metric tonnes worth Rs.3620.4 million, as compared to exports of 97,291 metric tonnes valued at Rs.2836.7 million in the previous year.

Interestingly, during 1991-92 India's share in the global markets for spices reached around 33 per cent, with the global trade estimated to be around of 4,00,000 tonnes by International trade centre, Geneva.

There has been a phenomenal rise in the export to the general currency area in the course of the last 2 to 3 years. In 1989-90, for instance the share of the general currency area in India's total exports of spices was 56 per cent, whereas in the following year, it went up to 64 per cent and further to 87 per cent in 1991-92.

(Economic and Commercial News 31(12), 1992, 9)

279

Cess on spices export goes

With a view to boost exports of spices oils and oleoresins, the Government has decided not to levy any cess on their exports up to June 30 next year.

A Commerce Ministry press note said the order has come into effect from July 1.

The total exports of spice oils and oleoresins in 1991-92 were of the order of Rs. 56 crore. Of this, 60 per cent of the exports were to the United States.
(Deccan Herald 7 July 1992, 13)

280

Processed food export target

The Union minister of state for food processing industries, Mr. Giridhar Gomango, today said that Rs.1200 crores had been earmarked as the target for the export of processed food, including marine products during 1992-93.

Addressing a press conference here, Mr. Gomango said that processed food worth Rs. 950 crores had been exported in the year 1991-92.

A food processing industry having six units would be set up jointly by an NRI and Tatum Sanchi, a reputed American poultry processing farm, at a cost of Rs. 500 crores shortly. The unit would process poultry products for export.

Stating that the foreign investment and promotion board (FIPB) had already cleared the project, Mr. Gomango said that the six units would be located in Delhi, Bombay, Madras, Calcutta, Bangalore and Hyderabad. The project is likely to come up very soon, he said.

The minister also said that Rs.700 crores had been allocated in the eighth five-year plan for project assistance and building up of infrastructure for the food processing units.

(Times of India 4 June 1992, 15)

281 No quarantine for fruits

The Sri Lankan government has exempted the import of apples, grapes and oranges from India from quarantine requirements.

The requirements were proving an obstacle to improving exports of these items to Sri Lanka, and with their removal, export of fruits will improve substantially, an official press note said here today.

(Financial Express 24 April 1992, 1)

282 Export, import controls to go by year end

The Union Minister of State for Commerce Mr. P. Chidambaram has said all controls on export and import trade would be removed by the year end. Participating in an open house discussion on the new Exim policy, organised by the Federation of Indian Exporters Organisations (FIEO) in Madras, he said the policy had removed all controls except some in view of the foreign exchange crunch.

He said the Centre wanted the rupee to become a fully convertible currency in the next four years and it could be achieved if the trade cooperated with the government.

(Chemical Weekly 37(39), 1992, 97)

283 Promising areas for exports identified

Barely six months after the Union commerce ministry identified 30 "extreme focus" areas for exports, a consultancy organisation based here has prepared reports that suggest marine products, mushroom cultivation and processing, cut flowers, computer software and soft ferrite as amongst the most promising areas for Indian entrepreneurs.

Detailed project reports suggest, for example, that the total world trade in cultivated mushrooms is likely to touch dlr 15 billion by 1996-97, from about dlr seven billion in 1989.

The reports, prepared by SBP Consultants and Engineers Private Limited, said India with its superior quality of mushrooms could easily displace China, Taiwan and Indonesia as world leaders, with a production exceeding 10 per cent of world production, if the schemes recently approved by the Planning Commission and the ministry of food processing were financially sustained.

Against an estimated demand supply gap in the world mushroom market of about 25 lakh tonnes, the current production in India was only 15,000 tonnes, the report said.

(The Economic Times 30 June 1992, 2)

IMPORT

284 New norms for import of cloves, cinnamon

The Government has decided to give licences for the import of cloves, cinnamon and cassia to the extent of 90 per cent of the value of licences issued in 1990-91 or 1991-92, whichever is higher, subject to the fulfilment of export obligation for twice the value of the import licence granted in the preceding year.

The aggregate minimum c.i.f. value of all the three items for the grant of licence will be Rs.5,000 in the case of each licence. Within this aggregate value, the entitlement for import of the three items will be proportionately indicated in the licence.

(The Economic Times 2 July 1992, 16)

TRADE INFORMATION

285 Exemption on chocolates to be withdrawn

If the Government goes ahead with its plans, one wouldn't be eating chocolates two months hence and some of the reputed confectionery companies in India like Cadbury's, Parry's, Parle and Morton may find their products seized from retail outlet and banned for public consumption.

The government has decided to withdraw the exemption granted to confectionery manufacturers with regard to mentioning the list of ingredients on packages weighing 20 gram or less, according to industry sources.

This move, on the part of the government, is purported to safeguard the rights and interests of consumers in the country.

Meanwhile, the companies have put up a representation against the amendment to the health ministry, who, sources indicate, is likely to favourably consider the case. But the Central Committee for Food Standards (CCFS) which is handling the case, appears to be in no mood to relent or succumb to industry pressures.

Cadbury's India Limited, Parle Products, Morton Confectionery, Parry's India, Campco and NDDDB were hauled up by the CCFS on charges of not mentioning the names of ingredients in their chocolate and toffee packets.

The companies claimed that it was not feasible to incorporate the names of the ingredients on confectionery packages weighing below 20 grams. They also said that, as 40 per cent of the confectionery market was dominated by the SSI sector with unbranded and unwrapped products, the established companies would be nargely affected.

(The Economic Times 3 July 1992, 2)

286

Mango identified as potential forex earner

The agri-business committee of the PHD Chamber of Commerce and Industry (PHDCCI) has identified mango as one of the potential products in the north to earn foreign exchange.

The committee chairman, Mr. Lalit Khaitan, said various steps are likely to be introduced such as organising mango promotion programmes, buyer-seller meets, development of packaging standards and printing of product literature.

During 1990-91, about 0.22 per cent of the total production of mangoes was exported as against 0.12 per cent in 1989-90 and 0.15 per cent in 1988-89, it said. The main importers of mangoes are United Arab Emirates (UAE), Kuwait, Qatar, Saudi Arabia, Bahrain, France, Oman, Switzerland, Germany and Canada.

(The Economic Times 1 July 1992, 3)

287

Ban on transporting wheat by rail affects flour mills

The 56 roller flour mills in Karnataka have been severely affected by the ban on movement of wheat by rail.

The mills which bear a total investment of Rs.100 crores in the state have been further incapacitated by the permission granted by the railways for the transportation of wheat based products, which has led to an influx of products from the wheat growing states of the north.

The mills which relied on the Food Corporation of India for supply of wheat have, since discontinuation of that source, been forced to rely on lorry transportation for their supply of the grain.

(The Economic Times 5 May 1992, 11)

288

State-wise distribution of roller flour mills

State/UT	1983	1984	1985	1986
Andhra Pradesh	27	47	51	51
Assam	16	18	19	18
Bihar	25	26	29	32
Gujarat	17	21	24	26
Haryana	12	12	12	14
Himachal Pradesh	3	3	3	4
Karnataka	34	40	40	44
Kerala	8	9	11	11
Madhya Pradesh	9	10	10	9
Maharashtra	25	30	39	41
Orissa	13	17	18	18
Punjab	18	21	21	21
Rajasthan	8	8	5	4
Tamil Nadu	33	39	42	41
Uttar Pradesh	50	53	58	56
West Bengal	34	36	34	35
Chandigarh	2	2	2	3
Delhi	12	12	12	11
Goa, Daman & Diu	1	1	1	1
J. & K.	12	15	16	16
Meghalaya	1	1	1	1
Nagaland	2	2	2	2
Sikkim	1	1	1	1
Tripura	2	2	2	2
Pondicherry	-	-	1	2
Total	365	426	454	464

Statistical Panorama, 1990, FCI, 200-201

289

State-wise distribution of rice mills (as on 1st January 1986)

State/Union Territory	Hullers	Shellers	Hullers cum Shellers	Modern/Modernised Rice Mills	Total
Andhra Pradesh	4609	776	2257	12995	20637
Assam*	17	-	319	239	575
Bihar*	4749	63	9	51	4872
Gujarat*	2105	132	260	1095	3592
Haryana	807	-	-	990	1797
Himachal Pradesh	1098	10	-	128	1236
Karnataka*	8081	848	653	1359	10941
Kerala	13220	4	11	402	13637
Manipur*	71	-	97	1	169
Maharashtra	6541	389	907	1654	9491
Madhya Pradesh*	3114	239	227	94	3674
Meghalaya*	85	-	8	-	93
Orissa*	3050	34	220	674	3978
Punjab*	4416	442	-	1965	6823
Rajasthan*	275	22	17	88	402
Sikkim*	17	-	-	-	17
Tamil Nadu	17342	138	342	2569	20391
Tripura*	689	5	8	1	703
Uttar Pradesh*	5707	562	150	1215	7634
West Bengal*	1151	55	110	161	1477
Chandigarh*	-	10	-	-	10
Delhi	7	-	-	26	33
Pondicherry*	203	-	8	26	237
D & N Haveli*	8	1	-	14	23
Goa, D. & Dlu	658	-	7	4	669
Total	44282	1317	3524	18768	67891

*Data for 1985 has been repeated.

Statistical Panorama, 1990 FCI, 199

290

Livestock products development council on cards

The Government will set up a National Livestock Products Development Council during the Eighth Plan to promote meat processing activities in the country. It will undertake various activities for the upgradation of meat industry including assistance for infrastructure and consultancy. The Central and State Government meat industries livestock rearers and other related bodies will be represented in the Council.

(Financial Express 7 May 1992, 1)

291 Govt. to set up advisory board on milk

The Government on Tuesday decided to set up a milk and milk product advisory board (MMPAB) to regulate the production, supply and distribution of milk and milk products throughout the country.

An official order issued by the Ministry of Agriculture under the Essential Commodities Act also stipulated mandatory registration of persons and establishments that handle more than 10,000 litres of milk in a day or 500 tonnes of milk solids in a year.

The proposed board will be headed by the Secretary of the Department of Animal Husbandry and Dairying with representatives from the ministries of industry, food processing, health and family welfare.

The Animal Husbandry and Dairying Secretary has been vested with the powers of the board till its actual constitution takes place, an official note said. (*Deccan Herald* 11 June 1992, 13)

292 Panel suggests ways to export agro-products

The expert panel on agro-exports has suggested that foreign collaborations should be allowed in agro-products with export potential. It feels that foreign participation is essential to attract latest technology in food processing to make Indian agro-products cost-effective and competitive in the international market.

It has further recommended creation of a special risk fund to encourage cultivation of horticulture, floriculture and processed foods. The fund is to be financed by the Centre, States and Nabard in 30:20:50 ratio respectively.

The group, which was set up by the Planning Commission to suggest agro-export strategy will soon submit its report to the agriculture minister, Mr. Balram Jakhar.

It is of the view that land holding laws should be amended to permit "large scale plantation for export purposes. Similarly, the processing industries cannot own land for growing raw materials for processed products. In order to encourage high tech agriculture these laws will have to be amended".

The panel has assumed a compounded growth rate of agro exports at 22.4 per cent in the Eighth Plan against 9.4 per cent in the Seventh Plan period. Consequently agricultural and processed food exports will be around Rs.7,000

crore. This will be in addition to the export of rice and other cereals expected to be Rs. 10,000 crore during the plan period.

It has suggested that a nodal agency for coordinating various activities with agro exports should be set up in the ministry for commerce with representatives from the ministries of agriculture, surface transport, railways and Indian Council for Agriculture Research. The Planning Commission should have a standing committee to monitor progress and provide policy perspectives.

The group is of the view that to capture the international market even sensitive agro products like onion, rice, wheat and tea should be exported irrespective of domestic needs. Commodities which are in short supply due to some reason should be imported to avoid crisis in domestic market.

The group has identified several constraints hampering agro-exports. These are volume deficiencies leading to a conservative policy of fixing export ceilings especially for sensitive agricultural items like non-basmati rice, wheat, sugar and molasses. Due to low productivity, cost of production is high. The group notes that in several products Pakistan's prices are lower by at least 42 per cent making it a far more attractive exporter than India.

The report highlights transportation problems. There are inadequate air cargo, shipping and rail transport facilities. The transport infrastructure has not kept pace with the growth in agro exports.

(Economic Times 11 June 1992, 2)

293

Move to promote R and D in vegetable oils

The Government will provide financial assistance for research and development activities related to development of vegetable oils. In this context, it has been decided to invite proposals in this regard from the institutions, organisations including associations like Solvent Extractors Association of India engaged in oil activities.

The broad areas for these proposals may be the activities to increase availability and acceptability of oils, primarily for human consumption. Proposals may also suggest cost-effective measures which would enable energy conservation, improvement in quantity and quality of oils. Activities leading to development of new procedures which may reduce losses and consumption of conservation and steam etc. will also be considered.

Some of the specific issues which may be adopted for R and D activities for financial assistance are:

- Technology for upgradation of non-edible oils to edible oils such as neem oil, karnaja oil, castor oil etc.
- Detoxification of oil seeds/oil cakes/extractions.
- Technology for production of margarine.
- Development of inexpensive packaging for edible oils.
- Assessment of present level of energy conservation in vegetable oil industry including oilseed crushing industry, solvent extraction industry and vanaspati industry.

Financial assistance will be provided under plan scheme of the Eighth Five Year Plan.

(Economic and Commerical News 31(13), 1992, 10-11)

294

Oilseeds stock limit increased

In a bid to boost exports, the Government has increased the stock limit of some oilseeds, for the export purpose, by amending the pulses, Edible Oilseeds and Edible Oils (Storage Control) Order, 1977.

Now the exporter of sunflower, groundnut and soya extraction will be entitled to hold the maximum quantity of raw material in the shape of seed or pod up to 1670 tonnes, 1790 tonnes and 1210 tonnes respectively against every export contract of 1000 tonnes.

In the case of HPS groundnut (kernels) and sesame seed, permissible maximum quantity of stock will be 2500 and 1250 tonnes respectively against every export contract of 1000 tonnes.

(Financial Express 3 June 1992, 1)

295

Indigenous palm oil

Indigenous edible grade palm oil is likely to hit the market soon and reduce India's giant edible oil import bill, following successful development of palm oil extraction technology by scientists here.

After four years of field trials, scientists at the Regional Research Laboratory (RRL), Thiruvananthapuram, are now helping set up India's first commercial plant for edible palm oil at Pedavegi in Andhra Pradesh.

The RRL technology has already proved successful at a demonstration plant, capable of processing 1000 kg of palm fruit per hour, located at Palode, 40 km North of here.

The process technology covers fruit harvesting, stripping, oil extraction and purification.

The red-coloured palm oil extracted by the RRL technology has very high levels of carotenoids compounds related to vitamin-A that provide the oil a potential role in combating vitamin-A deficiency.

Palm oil extracted from a commercially-popular species of the crop called "Tenera" has 700 parts per million of carotenoids, making it the richest natural plant source of pro-vitamin-A.

The red palm oil contains levels of a compound called retinol, 15 to 300 times higher than those found in common vegetable sources of this compound like green leafy vegetables and carrots.

These findings have prompted RRL to initiate studies with the National Institute of Nutrition (NIN) in Hyderabad to determine whether palm oil could be used in vitamin-A supplementation programmes.

Studies conducted by NIN on edible grade palm oil supplied by RRL have shown that the oil is nutritionally-adequate and safe for human consumption.

The red palm oil was found to be well-acceptable to 90 per cent of a group of children when it was incorporated into their mid-day meals, RRL scientists said.

(Financial Express 14 May 1992, 5)

296

Spices brand promotion

The Spices Board has launched its brand promotion scheme, aimed at creating a new image for consumer packs of spices and spice products abroad.

Under the scheme, exporters would be given up to 50 per cent of the total cost of publicity programmes abroad, in Indian rupees, as interest-free loans, a Spices Board press release said in Cochin on Tuesday.

(Financial Express 10 June 1992, 1)

297

Pakistan's tea market

India could tap the vast tea market in Pakistan to make up for the falling demand from the erstwhile Soviet Union.

The people of Pakistan relish Indian tea in comparison to other teas, and yet, Pakistan imports a mere 30,000 kg from India, as against a total domestic demand of 100 million kg, says Tea Time, a specialised journal of the tea industry.

It would cost Pakistan less freight to import from India than from any other country, says the journal, which focuses on Indo-Pakistan trade in its current issue.

(The Economic Times 19 June 1992, 3)

298

Food processing training centres for rural areas

The Government will set-up more than 200 food processing training centres in the rural areas to impart training in all areas of food processing, including production, marketing, quality control and overall management.

According to an official press statement, under the scheme, which will be implemented through the State Governments, co-operatives, autonomous bodies or voluntary organisations with the help of the Central Government, the trainees would receive practical experience of operating and managing food processing units of small-scale level.

In an effort to make the centres financially self-reliant, larger processing units would be encouraged to accept semi-processed products from these centres for final processing and marketing, the statement said.

(Deccan Herald 6 June 1992, 13)

FOOD REGULATION, QUALITY CONTROL AND HYGIENE

299

Blended edible vegetable oils grading and marking rules, 1991

G.S.R.657(E):-Whereas draft of the Blended Edible Vegetable Oils Grading and Marking Rules, which the Central Government proposes to make, was published, as required by section 3 of the Agricultural Produce (Grading and Marking) Act, 1937 (1 of 1937), on pages 2964 to 2970 of the Gazette of India, Part II, Section 3, Sub-section (i), dated the 8th December, 1990 as GSR 739 under the notification of the Government of India in the Ministry of Agriculture, Department of Rural Development No. 45011/4/90-M1 dated the 28th November, 1990, inviting objections and suggestions from persons likely to be affected thereby, before the expiry of the period of forty-five days from the date on which copies of Gazette containing the said notification are made available to the public;

And whereas copies of the said Gazette were made available to the public on the 8-12-1990;

And whereas the objections/suggestions received in respect of the said draft rules have been considered by the Central Government;

Now, therefore, in exercise of the powers conferred by section 3 of the said Act, the Central Government hereby makes the following rules, namely:

Rules

1. Short title, application and commencement:-

- (1) These rules may be called the Blended Edible Vegetable Oils Grading and Marking Rules, 1991.
- (2) They shall apply to the blends of edible vegetable oils produced in India.
- (3) They shall come into force from the date of their publication in the Official Gazette.

2. Definitions:-

In these rules unless content otherwise requires -

- (1) 'Agricultural Marketing Adviser' means the Agricultural Marketing Adviser to the Government of India.
- (2) 'Authorised packer' means a person or a body of persons who has been granted a certificate of authorisation to grade and mark blended edible vegetable oils in accordance with the grade standards and procedure prescribed under these rules.
- (3) 'Blended edible oil' means a mixture of anyone of the conventional edible vegetable oils with anyone of the non-conventional edible vegetable oils as specified under the Schedule I;
- (4) 'Certificate of authorization' means a certificate issued under the provisions of the General Grading and Marking Rules, 1988 authorising a person or a body of persons to grade and mark the blended edible vegetable oils with the grade designation marks;
- (5) 'Schedule' means a schedule appended to these rules.

3. Grade designation:-

The grade designations to indicate the quality of the blended edible vegetable oils shall be as set out in column (1) of Schedule-I.

4. Definition of quality:-

The quality indicated by the grade designations shall be as set out against each grade designation in columns (2) to (8) of Schedule-I.

5. Grade designation mark:-

The grade designation mark shall consist of,-

- (1) a label specifying name of the commodity, grade designation and bearing the design consisting of an outline map of India with the word 'AGMARK' and the figure of rising sun with the words 'Produce of India' and 'Bharathia Utpad' resembling the one as set out in Schedule-II; or
- (2) 'Agmark replica' consisting of a design incorporating the number of certificate of authorisation, the word 'AGMARK', name of commodity and grade designation resembling the one specified in Schedule-III:

Provided that the use of Agmark replica in lieu of Agmark Labels shall be allowed only to such authorised packers who have been granted the permission by the Agricultural Marketing Adviser or an officer authorised in this regard and subject to such conditions as may be specified from time to time.

6. Method of Packing:-

- (1) The blended edible oil shall be packed in new, sound and clean tins, sound and clean glass bottles or tetra packs or new sound and clean container, in the form of bottles, jars, cans or pouches (laminated, extruded, multilayer) made of food grade plastic materials.

Provided that the plastic container shall be manufactured out of food grades of plastic materials permitted under Prevention of Food Adulteration Rules, 1955.

- (2) The containers shall be free from insect infestation, fungus contamination, rust, imparting colour or deleterious substances or any undesirable or obnoxious smell;
- (3) Net weight of blended edible oils when packed shall be in the standard sizes, namely, 100 gms, 200 gms, 500 gms, 1 kg, 2 kgs and 5 kgs and volumetric packing upto one litre as permitted by the Ministry of Civil Supplies.
- (4) Each container shall be securely closed in the manner prescribed by the Agricultural Marketing Adviser.

7. Method of marking:-

- (1) The grade designation mark shall be securely affixed to or clearly and indelibly printed on each container as prescribed by the Agricultural Marketing Adviser;
- (2) Each package shall be prominently marked in bold letters with colour contrast to read,-

BLENDED EDIBLE OIL

This blended edible oil contains an admixture of:-

- (i) -----% by weight.
 - (ii) -----% by weight.
 - (Name of oils)
-

(3) In addition, following particulars shall be clearly and indelibly marked on each container,-

- (a) Name of the packer -
- (b) Date of packing -
- (c) Place of packing -
- (d) Lot/batch/Tankfill number -
- (e) Net weight

(4) The authorised packer may, with the approval of the Agricultural Marketing Adviser or an officer authorised in this regard, mark his private marks or trade marks provided that the same do not indicate quality other than that indicated by the grade designation mark affixed to the graded packages.

8. Special conditions for grant of Certificate of Authorisation:

In addition to the general conditions specified in sub-rule (3) of rule 3 of the General Grading and Marking Rules, 1988, the following shall be the additional conditions for issue of Certificate of authorisation for grading and marking of the blended edible vegetable oils granted under these rules, namely:-

- (1) The certificate of authorisation shall be granted only to a person or body of persons who have been authorised under the Prevention of Food Adulteration Rules, 1955, and is registered with the Union Ministry of Civil Supplies (Directorate of Vanaspati, Vegetable Oils and Fats) to process and sell the blended edible oils.
- (2) The authorised packer shall own machinery and equipment for mechanical expression, solvent extraction, refining of the vegetable oils or shall have appropriate arrangements for procurement of the mechanically expressed conventional oils and refined non-conventional oils of the prescribed quality.
- (3) The authorised packer shall set up in the authorised premises an oil grading laboratory fully equipped with all necessary chemicals and apparatus for testing the quality of vegetable oils prior to blending and also the quality of the blended oils,

- (4) The oil grading laboratory shall be manned by a qualified chemist approved by the Agricultural Marketing Adviser or an officer authorised by him in this behalf. However, the Agricultural Marketing Adviser may, if he considers necessary, provide the services of a Government chemist to an authorised packer. In such cases the authorised packer shall pay such charges as may be prescribed from time to time by the Central Government, towards the expenditure incurred in connection with the services of the chemist;
- (5) The premises for processing, blending and packing of edible oils shall be maintained in perfect hygienic and sanitary conditions and the personnel engaged in these operations shall be in sound health and free from any contagious disease;
- (6) The authorised packer shall provide all necessary facilities and assistance to the approved/Government chemist for carrying out the grading and marking of the blended edible oils under these rules;
- (7) The authorised packer shall maintain proper record of the individual constituent oils used for blending and the production of blends and shall submit periodical returns to the Directorate of Marketing and Inspection in the prescribed proforma.

SCHEDULE-1

(See rules 3 & 4)

Grade Designations and definition of quality of the Blended Edible Vegetable oil.

Grade designation	Description	Special requirements				General requirements
		Proportion of the edible conventional oil percent by weight. Not less than.	Moisture and volatile matter percent by weight. Not more than.	Acid value not more than	Unsataponifiable matter percent by weight not more than.	
						Flash point in Degree Celcius (by Penske Mertene Closed-cup method) not less than.

1	2	3	4	5	6	7	8
General Blend-A	The blend shall be admixture of any one of the conventional raw edible oils, namely, Coconut oil, Mustard oil, Groundnut oil or til oil obtained by mechanical expression, with any one of non-conventional edible refined oils, namely, cotton seed oil, soyabean oil, safflower oil or sunflower oil.	20	0.2	2.0	1.0	250	1.The blended edible vegetable oil shall be the admixture of a conventional edible oil with a non-conventional edible oil. 2.The constituent oils in the blend shall conform to the respective standards prescribed under the Prevention of Food Adulteration Rules, 1955. 3.The blend shall be clear, free from rancidity, suspended or insoluble matter, other foreign matter, separated water, added colouring matter and flavouring substances.
General Blend-B	The blend shall be admixture of anyone of the conventional raw edible oils, namely coconut oil, mustard oil, groundnut oil or til oil, obtained by mechanical expression with edible refined Rice-bran oil.	20	0.2	2.00	3.0	250	4.The blend shall be free from mineral oil, argemone oil, castor oil or any other oils or fats; 5.The blend shall not contain hydrocyanic acid, tricresyl phosphate or any imported oil.

SCHEDULE-II

[See rule 5(1)]

Design on the Agmark Label

SCHEDULE-III

(See rule 5(2))

Design of the Agmark Replica

*Name of commodity: BLENDED EDIBLE VEGETABLE OIL**Grade:*

[No.45011/4/93-M.I.]

SARALA GOPALAN, Jt. Secy.

(The Gazette of India Part II - Section 3 - Sub-section (i), No.394, 1991)

Prevention of Food Adulteration (Seventh Amendment) Rules 1991

G.S.R. 731(E) -- Whereas certain draft rules further to amend the Prevention of Food Adulteration Rules, 1955 were published as required by sub-section (1) of section 23 of Prevention of Food Adulteration Act, 1954 (37 of 1954) in the notification of Health and Family Welfare (Department of Health) No. G.S.R. 67(E), dated 11th February, 1991 in the Gazette of India, Extraordinary, Part II Section 3. Sub-section (i) dated the 22nd February, 1990, in page 1-6 inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of sixty days from the date on which copies of the Gazette of India in which the said notification was published were made available to the public:

And whereas the copies of the said Gazette were made available to the public on 26th February, 1991.

And whereas the objections and suggestions received from the public on the draft rules have been considered by the Central Government.

Now, therefore, in exercise of the powers conferred by sub-section (1) of section 23 of the said Act, the Central Government, after consultation with the Central Committee for Food Standards, hereby makes the following rules further to amend the Prevention of Food Adulteration Rules, 1955, namely:-

1.(1) These rules may be called the Prevention of Food Adulteration (Seventh Amendment) Rules, 1991.

2.They shall come into force on the date of their publication in the Official Gazette.

3.In the Prevention of Food Adulteration Rules, 1955, (1) in rule 49, after sub-rule 18 the following sub-rule shall be added, namely:-

"(19) No person shall sell protein rich atta and protein rich maida except in packed condition mentioning the names of ingredients on the label.

(2) in Appendix B--

(a) in item A. 18.01.02 -

(i) after the words "with groundnut flour", the following shall be inserted, namely:-

"or Soya flour". Or a combination of both.

(ii) after the words and figures "10.0 per cent", following words shall be inserted, namely:-

"Soya flour which is a solvent extracted flour used in such mix shall conform to the standards of Soya flour laid down under Solvent Extracted Oil, Deoiled, Meal and Edible Flour (Control) Order, 1976".

(b) in item A. 18.02.02 -

(i) after the words "with groundnut flour", the following words shall be inserted, namely:-

"or Soya flour; Or a combination of both".

(ii) after the figure and word "10.0 per cent", the following shall be inserted, namely:-

"Soya flour which is a solvent extracted flour used in such mix shall conform to the standards of soya flour laid down under Solvent extracted oil, Deoiled Meal and Edible flour (Control) Order, 1967".

(The Gazette of India, Part II-Section 3-Sub-section (i), No. 455, 1991, 4)

301

Rice Milling Industry (Regulation & Licensing) Amendment Rules 1959

G.S.R. 753(E) - Whereas the draft of certain rules further to amend the Rice Milling Industry (Regulation and licensing) Rules, 1959, was published as required by sub-section (i) of section 22 of the Rice Milling Industry (Regulation) Act, 1958 (21 of 1958) in the Gazette of India Extraordinary Part-II, Section 3, sub-section (i) dated the 18th Sept., 1991, under the notification of the Government of India in the Ministry of Food Processing Industries No. G.S.R. 592(E) dated the 18th September, 1991, inviting objections or suggestions from all persons likely to be affected thereby before the expiry of a period of forty five days from the date on which the copies of the official Gazette in which the said notification was published were made available to the public;

And, whereas the said Gazette was made available to the public on the 21st October, 1991;

And, whereas the objections and suggestions received from the public on the said draft have been considered by the Central Government;

Now, therefore, in exercise of the powers conferred by section 22 of the said Act, the Central Government hereby make the following rules further to amend the Rice Milling Industry (Regulation and licensing) Rules, 1959, namely:-

1.(1) These rules may be called the Rice Milling Industry (Regulation and licensing) Amendment Rules, 1991.

(2) They shall come into force at once on the date of their publication in the official Gazette.

2. In the Rice Milling Industry (Regulation and licensing) Rule, 1959, in the Schedule, in Form IV, in clause 3, in condition (3-D):-

(i) in the first proviso for the words "Sixteen years and three months", the word "Nineteen years and three months" shall be substituted;

(ii) in the second proviso, the following proviso shall be substituted, namely:-

"Provided that in the case of rice mill other than a single huller licensed prior to the 1st May 1970, the licensing officer may, for sufficient reasons to be recorded in writing, further extend the said period by three more years with effect from the date of coming into force of the Rice Milling Industry (Regulation and licensing) Amendment Rules, 1991".

(The Gazette of India, Part II - Section 3-Sub-section (i), No.470, 1991)

New and Revised Indian Food Standards

IS 13061: 1991	Meat and meat products - Detection of salmonellae (Reference method) Gr 7
IS 13264: 1991	Ready Khichdi mix. Gr 3
IS 13265: 1991	Ready vegetable Pulav mix. Gr 2
IS 13267: 1991	Ready Suji-halwa mix. Gr 2

(Standards India 5(11), 1992, 412)

303**Europe agrees to organic food regulations**

A regulating controlling organic food production and processing standards has been agreed by the EC. For the first time it sets out legislation for organically produced plant based food in the community. The main features are to set standards for organic production emphasising the importance of correct cultivation and rotation and the use of natural manures in maintaining crop fertility, new labelling requirements - where agricultural ingredients are at least 95 per cent organic and the remaining 5 per cent are approved (essential products which are not readily available in organic form), the term organic can be applied: imported products from outside the EC must have been produced according to equivalent standards. This is a major step forward to the organic produce industry and the consumer in the EC. Shoppers will be able to buy organic produce with the confidence of knowing exactly what they are getting.

(Chemical Weekly 37(30), 1992, 95)

304**Salt Act amended**

The Central Excise and Salt Act, 1944, has been amended by the Finance Act this year with the provisions relating to licenses being replaced by those for registration.

The new system requires one-time registration and would not require any renewal, a press release of the Collectorate of Central Excise and Customs said in New Delhi on Tuesday.

A prescribed application form for registration has been brought out by the Central Board of Excise and Customs in order to facilitate smooth transition from licence system to simplified registration system, the release said.

(Financial Express 3 June 1992, 1)

305**Nitrosamine in alcoholic beverages**

Beer is a product of malt which is fermented and bottled. Several nitrosamines can be formed during the malting process as it directly comes into contact with nitrous oxides. In Western countries malt is prepared by roasting of germinating grains by indirect method whereas in our country malting involves high temperatures treatment direct and indirect. Since beer is widely consumed in our country, attempts were made to estimate the quantity of volatile nitrosamines present in different brands of beer available.

Analysis of 50 samples of different brands and batches of beer by GC-TEA technique revealed that N. nitrosodimethyl amine is present in 70% of the samples ranging from 0.8 ug/kg to 2.5 ug/kg. About 33% of samples were between 0.8 ug/kg to 1.6 ug/kg. It is interesting to observe that around 27% of the samples showed values between 1.6 ug/kg to 2.4 ug/kg with about 6% of samples having higher than 2.5 ug/kg. In countries such as Germany, Denmark, Sweden where attempts have been made to reduce direct exposures to higher temperature, nitrosamines are below 0.6 ug/kg whereas in Austria and Great Britain, the values are around 1.6 ug/kg to 2.5 ug/kg. The results clearly indicate that beer can be one of the contributors to the preformed nitrosamines load even in our country and therefore chronic alcoholics need to watch out as nitrosamines are potent gastrointestinal carcinogens.

(Nutrition News 13(1), 1992)

306**Are gene-altered foods really safe ?**

New genetically-engineered foods, touted by the Bush Administration and the bio-technology industry as safe for consumers and a boon to farmers, might turn out to be a mixed blessing, critics say.

They questioned whether the foods might lead to unexpected problems down the road. And they doubted whether farmers and consumers would see real economic benefits from the new crops.

"This is a whole new type of food that's right out of science fiction", said Mr. Jeremy Rifkin, President of the Foundation on Economic Trends, which has monitored the bio-technology industry for the past decade.

About 30 companies are developing dozens of different crops including tomatoes, melons, potatoes, celery, carrots and cucumbers that contain new proteins, enzymes or other substances, that the bio-tech industry says, improves the quality of these foods.

Scientists will be able, through gene-splicing, to produce food that is tastier, more nutritious and longer-lasting, said Mr. Richard Godown, President of the Industrial Biotechnology Association.

Gene-altered foods, many resistant to certain pests, disease and drought, will also require less fertiliser and pesticides, cutting costs for farmers and increasing crop yields, he said.

Products being developed include potatoes containing silk moth genes to increase disease resistance, corn with firefly genes that reduce insect damage and tomatoes with flounder genes to reduce freezing damage.

But, while gene-altered foods are at first glance revolutionary, groups representing farmers and consumers said they had serious questions about the new technology.

"When you take a gene from one species and place it into another that is completely unrelated, you have no idea how it will combine", Mr. Rifkin said. "There is nothing in human evolution that serves as a guide".

"You really don't know whether it's benign or a killer". Mr. Rifkin said.

Mr. Rifkin noted that L-tryptophan, a genetically engineered diet supplement, was not regulated by the Food and Drug Administration (FDA) but was eventually ordered off the market after hundreds of people who used it became ill, some fatally.

"I don't know of any technology that doesn't come with both risks and benefits". said Mr. Rifkin.

Mr. Rifkin said he and four Florida farmers would file a suit in Federal Court to stop any genetically-engineered food from coming to market unless FDA goes through a formal rule-making procedure.

Besides the unknown side of gene-splicing to create new foods, there are religious and medical concerns that need to be addressed through labeling, said Dr. Rebecca Goldberg of the Environmental Defence Fund.

Some people have allergies to certain foods that could be contained in an altogether different product. They could have religious reasons for not eating a food or mixing animal and vegetable products.

Without labeling, consumers will have no idea what they are buying", Dr. Goldberg said. "They have a right to know what's in their food".

(Financial Express 30 May 1992, 3)

TRANSFER OF TECHNOLOGY AND NEW INDUSTRIES

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Food processing unit

The Andhra Pradesh Chief Minister, Mr. N. Janardhana Reddy, on Sunday laid foundation stone for the Rs.100 crore food processing plant being set up by a non-resident Indian (NRI) at Gajulamandyam, near here.

The plant, one of the fully export oriented multi-purpose and multi-functional food processing units, would have the state-of-the-art technology from Canada and Italy.

Agricultural food produce such as tomato, mango and citrus procured from surrounding villages of Rayalaseema would be processed, tinned, packed and exported to earn foreign exchange, an official release said.

(*Financial Express* 23 June 1992, 4)

308

Fruit Processing Unit

Karnataka State Industrial Investment and Development Corporation Ltd., (KSIIDC) has signed a memorandum of understanding (MoU) with Pallavi Food Products and Beverages Pvt. Ltd., for setting up a 100 per cent export-oriented fruit processing unit with the assistance of Danish Chamber of Commerce and IFICON, Copenhagen.

The proposed unit will process banana, mango, guava and passion fruits. It will be set up either in Bangalore or Kolar district at an estimated cost of Rs.12.93 crores inclusive of the cost of imported equipment valued at Rs.8 crores.

(*Financial Express* 19 May 1992, 4)

309

Meat processing plant

The Centre has cleared a United States-aided joint sector project for setting up of meat processing plants in Cochin, Bangalore, Bombay, Hyderabad, Madras and Calcutta, Union Food Processing Industries Minister Giridhar Gomango said today.

He told UNI here that the Cochin plant would be started soon and added negotiations were almost complete.

He said discussions were on for the setting up of two fish processing units respectively in Kerala and Andhra Pradesh with Australian assistance. While Visakhapatnam had been selected for the unit in Andhra Pradesh, the location in Kerala would be finalised shortly, he added.

(*Deccan Herald* 14 June 1992, 14)

310 Mushroom plant

Nagarjuna Finance Ltd. (NFL) is setting up a 100 per cent export oriented mushroom project, with plans to produce 2000 tonnes of mushrooms per annum.

(The Economic Times 5 May 1992, 10)

311 Spirulina as health food

Ballarpur Industries Limited (BILT), a Thapar group company predominantly in paper and chemicals, is making a foray for the first time in the field of biotechnology and health foods.

The company has identified Spirulina, touted by scientists as one of the most nutrient natural foods in the world, to launch their venture. This is the first and only company in India to commercially develop Spirulina, a blue-green algae for the export market, according to Mr. D D Saxena who heads the Food and Special Projects Division at BILT.

BILT is setting up the plant at Nanjungud, near Mysore with a capacity of 250 tonne per annum. This is supposed to be the world's biggest plant, according to Mr. Saxena. The company plans to export 95 per cent of its production.

(The Economic Times 27 June 1992, 10)

FEATURE ARTICLE**FRESH FRUITS AND VEGETABLES - THEIR PRESERVATION AND TRANSPORTATION****V.B. DALAL**

It is a universal fact that any country which grows tropical, subtropical and temperate fruits and vegetables on an extensive scale, requires an organized system (i) to select gardens/orchards/farms/viniyards based on certain specific quality norms, before harvesting fruits/vegetables at their required stages of maturity, (ii) to handle scientifically fresh produce with or without available tools, (iii) to treat fresh produce with known harmless chemicals and/or physical methods, (iv) to pack produce in the most suitable manner in well tested and proven containers for the purpose of transporting for storage/sale, (v) to adopt scientific practice of storing fresh produce at their required temperature, relative humidity, air exchange rates, gas concentration, etc., (vi) to obtain their maximum storage life on the basis of their ability to retain marketability, and (vii) to find the time for their disposal with minimum loss. It is also imperative to evolve a scientific and statistical method to determine specifically the suitability of the fresh produce for short and long term storage, to adopt a proper code of inspection practices for internal and export trade and market requirements of the fresh produce at retail outlets and in addition to all these, a sound knowledge and experience in the packing house operations on variety of machines for large scale commercial handling of different fruits and vegetables.

India's total production of fresh fruits and vegetables which is now 75 million tonnes may meet a sad end unless a proper scientific system to harvest, handle, treat, pack and store to cut down on their wastage is evolved and put into operation.

The losses in fresh fruits and vegetables have been attributed to several factors including -

- i inadequate knowledge in the detection and harvesting of required maturity of fresh produce for short and long term storage;
- ii unscientific handling of the fresh produce;
- iii inadequate treatment;
- iv improper packaging;
- v indifference to quality criteria;
- vi non-scientific methods of storage and transportation;
- vii lack of proper education of the growers, handlers, packers, shippers and retailers; and
- viii non-availability of guidelines such as DO's and DONT in the matter of selection, harvesting, handling, treating, packing, transportation and storage of fresh fruits and vegetables.

The knowledge acquired through education and continuous exposure to the new and well proven scientific methods and access to the latest information will instil confidence in persons connected

with the fresh fruit and vegetable trade. At least, such knowledge will assist in the identification of the exact source of trouble and thereby seek the right type of guidance as and when needed.

As long as the minimum 75% of the growers, handlers, packers, shippers and retailers do not acquire fairly good knowledge through education in the art of selection, harvesting, handling, treating, packing, transportation and storage of perishable produce, it will not bring about desirable qualitative change in the present uncertain marketing system. The marketing system needs proper discipline and direction and must maintain consistency in quality and packing to bring in the legitimate profits to both the producer and the consumer.

Therefore, the first requirement in our fresh fruit and vegetable trade is to educate those engaged in this trade and to impart as much as possible a fund of appropriate knowledge to the concerned class of people at all levels of operations pertaining to the fresh fruits and vegetables.

This paper presents, in general, information on the following aspects:-

- (a) quality norms for the selection of gardens, orchards, farms, vineyards, for short and long term storage of fresh fruits and vegetables;
- (b) quality specifications of fresh fruits/vegetables in general;
- (c) various methods to extend the storage life of fruits and vegetables;
- (d) packages suitable for extending the storage life of fresh fruits/vegetables and their stacking pattern in truck/wagon;
- (e) handling of the cold stored produce; and
- (f) packing House Operations of some fruits and vegetables - sorting, grading, treating, and packing on machines.

In fruits and vegetables, quite a few physiological processes begin at the time of harvest due to the fact that their normal supply of water, minerals, and organic nutrients ceases after separation from their parent plant.

The metabolic shifts result in the manifestation of different physiological disorders, namely, yellowing, scald, brown core, wilting, browning of the skin and flesh tissues, toughening, hardcore, sprouting, rooting and decay due to microbial invasion of the susceptible tissues of fruits and vegetables.

The storage life and the keeping quality of fruits and vegetables are influenced by the intensity of the physiological activities taking place in the detached produce. Fleshy fruits after maturation enter the final phase of ripening representing the senescence unlike fleshy roots, tubers and bulbs which germinate representing growth.

Based on the rate of perishability of the fresh fruits and vegetables at ambient temperature conditions, they are placed under the four categories.

I Highly perishable (few hours to 4 days)

Fruits

Apricots, Berry fruits (Raspberries, Strawberries, etc.), Cherries, Custard apples, Figs, Ripe guavas, Ripe papaya, Ripe sapota, Ripe mango, Ripe banana, Yellow limes, Lychees.

Vegetables

Amaranthus, Coriander, Fenugreek, Spinach, Radish with or without leaves, Okra, Green beans, Snake gourd, Green chilles, Cauliflower, Green corn, Cucumber, Capsicum, Green peas in pods, Lobia, Guar phalli, Mint, Red tomato, Mushroom, Drum stick, Celery, Lettuce, Leeks, Lotus or Kamal kakri, Bitter gourd.

II Short life (4 days to 10 days)

Fruits

Avocado, Grapes, Raw banana, Plantains, Raw mango, Hard/mature sapota, Mandarins (loose skinned orange), Peaches, Plums, Muskmelons, Cantaloupes, Lemons, Green limes, some varieties of pears, Unripe mature guavas, Unripe/mature papays

Vegetables

Cabbage, Brinjals, Tomatoes mature green/turning, Water melon, Topped carrots, Parwal, Knol-khol

III Medium storage life: (10 days to 15 days)

Fruits

Coconuts, Mosambi or tight skinned oranges, Grape fruits, Some varieties of apples, Honey dew, Jack fruit.

Vegetables

Marrows, Squashes, Early onion, Sweet potato, Turnip, Bread fruit (Katol)

IV Long storage life (15 days to 21 days)

Fruits

Some varieties of apples, Pomegranate, Dates, Some varieties of pears

Vegetables

Beet root, Onion late crop, Potato, Colocasia, Pumpkin, Garlic, Yam, Ginger.

There are a few factors which govern the storage life of fresh fruits and vegetables. They are:-

- (a) Prevailing climatic conditions and cultural practices of the growing region
- (b) Cultivar/variety and stage of maturity at harvest
- (c) Picking methods and extent of damage
- (d) Incidence of latent or current infection
- (e) Time interval between harvesting and storage at their respective optimum low temperature conditions
- (f) Cooling rate of the fresh produce after harvest
- (g) Storage temperature, relative humidity, air exchange rate, carbon dioxide, ethylene concentration in the chamber, and other aspects.
- (h) Physical and chemical treatments, the produce is subjected to
- (i) Package system including type, nature, quantity packed, packing methods.
- (j) Handling of fresh produce from the farms to retail outlets
- (k) Air circulation/ventilation during storage

- (l) Density of loaded material in the chamber
- (m) Type of transportation for the produce like loose/bulk/ small containers
- (n) Sanitary condition inside the chamber
- (o) Air distribution system inside the chamber - vertical/horizontal
- (p) Storage of mixed produce or of different varieties together in the same chamber
- (q) Stacking of produce in the chamber
- (r) Invasion of fresh produce by rodents and insects in the chamber
- (s) Frequent failures of power and electricity affecting the storage temperature and relative humidity conditons and air circulation
- (t) Storage of fruits or vegetables with decayed or produce with any physiological disorder
- (u) Methods adopted like sorting, grading, packing, etc.
- (v) Inspection of fresh produce prior to storage
- (w) Required quality characteristics of fruits and vegetables for short and long term storage.
- (x) Exposure of fruits and vegetables to variety of environmental changes affecting its quality
- (y) Rough or immediate handling of cold stored fruits or vegetables for transporting them to the retail outlets without waiting for the temperature to rise or attain ambient temperature.
- (z) Transporting cold stored produce at high temperature for further storage at its required low temperature. Such rise in temperature for a while followed by lowering the temperature causes physiological damage.

(A) Quality norms for the selection of gardens, orchards, farms viniyards, etc., for long and short term storage of fruits and vegetables

Before selecting any garden, orchard, farm, viniyard, the required quality specifications for short and long term storage of different fruits and vegetables must be prepared and based on the specifications the proforma is prepared which is applicable to the respective fruit or vegetable.

Each proforma, lists in a serial order, specific requirement in brief and the scores from 0.5 to 10 points are allotted to each specific requirement. There may be listed in each proforma 15 to 25 specific requirements for each respective fruit or vegetable; the garden/orchard/farm/viniyard which scores 48 and above are considered as excellent and those which score less than 48 up to 42 are considered good and those scoring below 42 but above 38 are considered suitable for selection. However, those which get scoring below 38 are cosidered risky and not recommended for selection. Specific requirements for garden/orchard/farm/viniyard are described in general and may be modified depending on the fruit and vegetable in question. An illustration of the proforma is presented below.

The proforma should list the following specific requirements:

Name of the garden/orchard/farm/viniyard

Location of the garden, orchard, farm, viniyard

Date of visit:

Serial Number:

Grower's name:

Particulars of specific requirement

-
- | | |
|--|--|
| 1. Location | (i) Accessible by road/rail/any other
(ii) Convenience |
| 2. Condition | Sanitation in the field/health of the garden/orchard/farm/viniyard |
| 3. Number of trees/plants | (a) Number of healthy/unhealthy
(b) Height of plants/trees
(c) Their arrangement |
| 4. Stage of maturity | Optimum/less than optimum/more than optimum |
| 5. Normal | The number of plants/trees |
| 6. Total number of fruits/vegetables in truck loads | |
| 7. Average weight of fruit/vegetable/bunch etc., | |
| 8. Number of probable harvests | |
| 9. Quality of fruits/vegetables | |
| (i) Deformity | |
| (ii) Size of fruit/vegetable | |
| (iii) Status - healthy or not; normal/abnormal | |
| (iv) Colour | |
| (v) Texture/stage of ripeness | |
| (vi) Physical appearance | |
| (vii) Blemishes | |
| (viii) Damaged/diseased/with disorder | |
| (ix) Defects | |
| (x) Cultivar characteristics - conforming/not conforming | |
| 10. Personnel available for harvesting, handling, etc., skilled/unskilled/etc. | |
| 11. Facilities available in garden/orchard/farm/viniyard | |
| 12. Availability of electricity | |
| power | |
| water | |

13. Any abnormality seen in fruits/vegetables

14. Source of the recommendation of the garden/orchard/farm/viniyard

This proforma with specific requirements is general one, and it is just an illustration. For further details the Author may be consulted.

(B) Quality specifications of fresh fruits and vegetables in general

For internal and export trade of fresh fruits and vegetables, quality parameters or specifications become necessary and these must be based on the realistic assessment of the availability of such fruits and vegetables on a large scale in the country. Any quality parameter or specification of a fruit or vegetable pertaining to any foreign source or based on the foreign books, cannot be considered as that variety of cultivar with that typical parameter may not be grown in the country on a large scale or on a limited scale and its availability in the country may be doubtful. Hence, realistic assessment of those fruits and vegetables with available desirable quality characteristics must be made in the existing gardens, orchards, farms, viniyards and a list prepared so that our specifications of different fruits and vegetables will be most realistic.

From the point of storage, quality parameters of every fruit and vegetable must be taken into consideration before harvesting the produce. Quality criteria vary from fruit to fruit and vegetable to vegetable. Preferred stages of harvesting with respect to maturity and relevant quality parameters are presented for fruits and vegetables separately.

<u>Broad category of fruits</u>	<u>Quality parameters</u>	<u>Name of fruits</u>
Stone fruits	Freedom from decay, disorder, blemishes, bruises, maturity conforming to required length of storage, acid/sugar ratio in unripe ones 3 to 4; sinkers in salt solution; fruit pressure over 14 lb/ sq. inch. True colour and characteristics of the cultivar. Ability to ripen at the ripening temperature.	Mango, Peaches, Plums, Apricots
Pseudo fruits	Maturity and colour conforming to the cultivar characteristics. Fruit pressure 13-18 lb/sq. inch at harvest, freedom from scald, scab, lenticel spot, disease, disorder, bitter pit, flyspeck, starch content 1/3 - 2/3 at harvest or starch pattern index 3.5 - 5 or seed colour index 5 - 6, number of days between full bloom and harvest.	Apples, Pears
Citrus	Maturity determined by ease of picking/separation from the parent plant; acid/sugar ratio, juice content over 50%; colour true to cultivar characteristics, freedom from blemishes, decay, disorder, oil cell breakdown, bruises, etc.,	Loose and tight skinned Oranges, Limes, Lemons, Grapefruits

Other fruits

Latex watery at harvest, colour Papaya streaks at the stem end, shape, size, colour conforming to the cultivar. Freedom from decay, Disorders and bruises, Ability to ripen.

Firm, smooth skin, fruit pressure 12 Sapota lb/sq.inch at harvest, colour true to cultivar, freedom from decay, disorder and bruises, smooth skin, on rubbing with thumb milk latex does not appear.

Colour of the skin and net-ground Cantaloupe Muskmelon colour, stem scar position, colour of pulp, sugar content, presence of distinct aroma

Vine fruits

Maturity on the basis of number of Grapes berries per cluster, colour of berries, bloom on berries, free from blemishes and bruises, decay, disorder. Juice content. Cultivar conforming to seed characteristics, sugar acid ratio, size, shape, colour of stalk.

Parthenocarpic

Pulp/peel ratio, Colour of skin/pulp, Banana odour of pulp, girth circumference, harvesting criteria based time of emergence of inflorescence and harvest, ability to ripen at ripening temperature and relative humidity conditions, freedom from blemishes, defects, decay, disorder, bruises, firm when unripe, true characteristics of the cultivar

In addition to the above parameters, shape, size and weight have to be considered. For further details of each fruit the Author may be consulted.

Broad category of vegetables**Quality parameters****Name of vegetable****Leafy and immature flower heads**

Garden fresh, Crisp, Turgid, True Coriander, Cabbage, Cauliflower, cultivar colour, Bloom on leaves, Spinach, Fenugreek, Lettuce, Freedom from blemishes, Decay, Amaranthus, Mint, Onion Green Disorder, True to cultivar characteristics, Strong flavour, Leaves crisp without yellowing and squeak when rubbed (Cabbage), Heavy for size (Cabbage), Curds without Riciness/Browning (Cauliflowers), Young inner leaves yellowish (Spinach), Midrib intact (Lettuce), Roots clean (Onion green)

Unripe fruity vegetables

Garden fresh, Turgid, True to cultivar characteristics, non-fibrous, Normal seed bulge, Firm, Tender, Free from browning blemishes and decay disorder, Non wilted snap on pressure (Beans), Seeds grass green well rounded and not yellow (Peas in pods), Ends break easily, seeds not visible and ridges not discoloured (Okra), Beans break easily: Seeds not visible and stem green and turgid (Brinjal and Capsicum), Kernels pale cream, Yellow plump and not indented (Corn), Shiny and spring back into shape when bent (Capsicum), ends not pinched (Cucumber)

Beans, Peas in pods, Okra, Brinjal, Cucumber, Capsicum, Sweet corn, Summer squashes, Tinda, Bitter gourd, Coccinia

Ripe vegetables

True to cultivar characteristics, Free from decay, Disorder, Insect attack, Blemishes, Bruises; Firm glossy, Turgid; Mature Healthy without cracks, seeds embedded in gelatinous matrix with breaker or turning stage (Tomato), Colour development without carbide (Tomato), Tender, Well formed skin (Winter Squash), Mature and yellowish orange in colour (Pumpkin), Turgid peel firm, Juice content 50% and Seeds well developed, Peel moisture 85% (Yellow/Green Limes)

Tomato, Winter Squash, Pumpkin, Limes

Under ground structures

Firm, Tender, True cultivar characteristics, Free from blemishes, Shrinkage, Decay, Disorder, Cuts, Sprouts, Roots, 10% of the weight of individual potatoes in a lot, Not to have 1/4 of their skin missing/feathered (Potato), Cured skin and papery (Onion), Non-removal of the skin by rubbing and sugar less than 0.15% (Potato), Firm and Non-flexible or rubbery (Carrot and Radish), Neck dry and not thick (Onion) without translucent scales (Onion)

Potato, Onion, Carrot, Radish, Ginger, Sweet potato, Turnip, Yam, Lotus stem, Garlic, Water chestnut.

In addition to the above characteristics, use other parameters also like shape, size, weight, etc.

(C) Methods to extend the storage life of fruits and vegetables

Fruits and vegetables being perishable after harvest, their rate of deterioration depends on the temperature of storage. Deterioration may be loss of moisture (wilting), loss of texture (softening), heat build up due to increase in the respiration rate and susceptibility of their tissues to pathogenic organisms, changes in quality, etc. In order to extend their storage life after harvest, at ambient temperature, and at their optimum low temperature conditions, the following methods are suggested:

For the extension of storage life of fruits and vegetables at ambient temperature, there are three methods which are of some use. (a) Prepackaging, (b) Waxing, and (c) Ionizing radiation.

(a) **Prepackaging of fresh fruits and vegetables:** Prepackaged fresh produce may be stored for a short period at ambient temperature. The practice of prepackaging fresh produce before sales is

common but not without problems. It is safe to use low density polythene film with vents. Polythene is synthetic transparent, thermoplastic film, moisture proof and permeable to gases like CO₂ and O₂. Higher the density of polythene tougher the material, but has low gas transmission rate. Prepackaging of some fresh fruits and vegetables in vented polyethylene containers is presented in Table 1.

Table 1 Prepackaging some fresh produce

Name of produce	Polythene specifications		No. of vents	Qty (g)	Storage life at RT (days)
	Size (inches)	Gauge			
Beans	10 x 10	200	20-24	500	2-3
Brinjals	10 x 12	200	20-24	500	8-9
Carrots topped	10 x 12	200	20-24	500	4
Cauliflower	6 x 6	200	10-12	one curd	2-3
Coriander	10 x 12	100	15-20	75	2
Green chillies	10 x 12	100	20-24	250	3
Coccinia	10 x 12	200	20-24	250	4-5
Cucumber	10 x 12	200	20-24	4 in each	4-5
Curry leaves	10 x 12	100	No vents	75	2
Mint	10 x 12	100	15-20	75	2
Okra	10 x 12	200	No vent	500	3-4
Capsicum	10 x 12	200	No vent	500	4-6
Peas in pods	10 x 12	200	20-24	250	1
Spinach	10 x 12	100	15-20	75	2
Radish topped	10 x 12	200	20-24	500	2-3
Turnip	10 x 12	200	20-24	500	4
Tomato Red	10 x 12	200	20-24	500	4
Limes	10 x 12	200	20-24	500	4
Grapes	10 x 12	200	24-30	500	4-6
Mosambi	12 x 12	200	20-24	12 nos	7-9

Source: CFTRI Packaging Discipline and author's experience

(b) *Waxing of fresh fruits and vegetables:* Waxing or skin coating of some fruits and vegetables is found to be useful in extending the storage life by 50% at ambient temperature. Waxing is done either by spraying the water wax emulsion on the produce while moving on the conveyor or by dipping the fruits/vegetables in a tank with wax emulsion for a minute. Thereafter the fruits and vegetables are dried in air or with hot air at 60° C. The storage life of waxed and unwaxed fruits and vegetables is presented in Table 2.

Table 2 Storage life of waxed and unwaxed fruits and vegetables

Name of fruit/ vegetable	Waxed		Unwaxed
	Conc. of wax	Storage life	Storage life
	emulsion (%)	(days)	(days)
Apples	8-12	30-40	15-20
Avocado	4-6	7	4
Arecanut	4-6	15-20	7-10
Brinjals	12	8-10	4-6
Carrot topped	12	9	6
Banana unripe	6-8	12	8
Capsicum	12	9	4
Coccinia	12	9	5
Coconut	6-8	25	8
Cucumber	12	7	4
Grapes	3-4	12-14	5-6
Guava	6	6	4
Limes green	6-8	10	5
Limes yellow	6-9	9	6
Mango unripe	4-6	16	11
Musk melon	4-6	4	2
Canteloupe	6	10-12	6
Mandarin orange	6	20	11
Mosambi	9	30	16
Parwal	12	4	2
Papaya	6	4	2
Pineapple	6	10	7
Potato with sprout inhibitor	12	60-80	30-40
Ribbed gourd	12	5	3
Snake gourd	12	8	3

(c) **Radiation preservation:** Preservation of fruits and vegetables by ionizing radiation has been studied and found to be technically feasible. On the basis of the scientific evidence available, the Joint FAO/IAEA/WHO Expert Committee on the wholesomeness of irradiated food (JECFI) in November 1980 concluded that irradiation of any food commodity up to an overall dose of 10 KGy (1 Mrad) causes no toxic hazard. In India, potato of different cultivars when irradiated with a dose of 10-14 Krad and stored at room temperature had 4 to 5 months storage life with minimum or no sprouting. Similarly onion when irradiated with a dose of 6-9 Krad inhibited sprouting for over 7 months. Among the fruits, bananas and mangoes have also responded to irradiation as was evident by delayed ripening. Bananas at 75% stage of maturity and mangoes in mature and unripe condition, when irradiated with 25 Krad gave a storage life, in the same condition for 7 and 10 days respectively at room temperature.

In order to minimize storage losses and to retain the keeping quality of the fresh produce, one of the methods which is time tested and most reliable is in the application of refrigeration to fresh produce. This method reduces the temperature of the commodity by removing heat immediately or within a reasonable time after harvest, thereby accomplishing a considerable fall in the rate of respiration and building up of heat of respiration, thermal decomposition and microbial spoilage and thus retaining the quality of the produce very close to fresh condition with subsequent increase in their storage life without adversely affecting their commercial or nutritive value or normal process of ripening. It is also possible to achieve extended storage life over the cold storage by the following aids namely, controlled atmosphere storage and hypobaric storage at their optimum low temperature storage conditions. By controlled atmospheric storage at their optimum cold storage conditions, the storage life is further extended by 20-80% over the low temperature storage in air but only some fruits and vegetables will respond to controlled atmosphere storage. Hypobaric or storage at low atmospheric pressure, some fruits and vegetables at their optimum cold storage conditions recorded an extension in storage life by 100-500%.

Produce which can be stored at the optimum low temperature storage condition is presented below:

Storage temp. 0°C; RH 85-95%; (Storage life indicated in days in parentheses)

Apple (non-chilling) (90-240), Apricots (7-14), Berries (2-28), Sweet cherry (14-21), Sour cherry (3-7), Coconuts (28-84), Dates (165-365), Figs (7-10), Grapes (56-180), Peaches (14-42), Plums (14-28), Lima beans (7-10), Beetroot (90-150), Cabbage (28-42), Topped carrots (28-180), Cauliflower (20-30), Coriander (5-7), Sweet corn (4-6), Celery (14-28), Bitter gourd (7-14), Garlic (140-210), Knol khol (56-84), Lettuce (14-21), Leeks (14-21), Mushroom (7-10), Onion (30-180), Peas in pods (7-10), Topped radish (21-28), Spinach (10-14), Turnip (60-120)

Storage temp. 3-5°C; RH 85-90%

Apples (Chill sensitive) (40-45), Cranberries (60-120), Litchi (21-35), Mosambi (21-44), Pomegranate (28-56), Cantaloupes (10-14), Red tomato (5-8), Water chestnut (100-120)

Storage temp. 7 ± 0.5°C, RH 85-90%

Custard Apple (14-21), Mandarin (60-75), Snap beans (10-14)

Storage temp. 10 ± 0.5°C; RH 85-90%

Grape fruit (28-42), Guava (14-21), Limes (21-42), Pineapple (14-36), Muskmelon (14-28), Honeydew (21-28), Watermelon (14-21), Cucumber (10-14), Green chillies (10-14), Brinjals (10-16), Okra (7-14), Capsicum (12-18), Tomato/Turning (7-14).

Storage temp. 12-14°C; RH 85-90%

Banana (green, mature, unripe) (7-28), Breadfruit (14-40), Jackfruit (14-45), Lemon (30-180), Mango (unripe, green) (14), Papaya (7-21), Plantains (10-35), Sapota (14-18), Colocasia (84-180), Ginger (90-180), Sweet potato (90-180), Squash (84-150), Tomato (mature green) (21-28), Tori (7-14), Yam (50-115)

Storage temp. 18-20°C; RH 85-90%

Snake gourd (14)

Chemical and physical treatment prior to storage:

Prior to storage, vegetables are sprayed with or dipped in a solution of water + chlorine. The water is charged with 100-600 ppm of chlorine. Other chemicals which are in use on vegetables include thiabendazole, Bavistan, Sodium ortho phenyl phenate in concentration varying from 0.1 to 0.5%. The fruits are treated with Bavistan, Imzalil, Thiabendazole, SOPP, etc. Potatoes are treated with a sprout inhibitor in the cold storage rooms to inhibit sprouting. Recent trend is towards the use of fungicidal fumigants which are developed by some foreign countries and yet to be tried in India. Hot water treatment of some produce is also recommended. When the produce is waxed, the wax emulsion is charged with the required fungicide in the required concentration. The fungicides and bactericides must be approved ones by the Authorities and must be harmless to human beings.

Extension in storage life is obtained by adopting controlled atmospheric storage and also hypobaric storage at their required optimum low temperature. Extension in storage life under controlled atmosphere with certain concentration of oxygen and carbon dioxide for some fruits and vegetables is presented in Table 3.

Table 3. Extension of storage life of fruits and vegetables stored under controlled condition of oxygen and carbon dioxide

Name of produce	CA storage		Storage life (days)
	O ₂ conc %	CO ₂ conc. %	
Apples	2-3	1-2	110-200
Apricot	2-3	2-3	9-18
Banana (unripe)	2-5	2-5	28-42
Strawberry	10	15-20	30-40
Cherry sour	3-10	10-12	10-12
Cherry sweet	3-10	10-12	16-25
Lemon	5	0-5	40-200
Lime	5	0-10	24-50
Peaches	2	5	20-50
Pear	2-3	0-1	52-70
Plums	2	0-5	20-35
Cantaloupes	3-5	10-15	15-21
Cabbage	3-6	5-7	30-42
Sweet corn	2-4	10-20	6-8
Onion	1-2	0	40-220
Tomato green	3-5	0	25-35
Tomato Breaker's	3-5	0	10-16

Table 4. Comparative storage life of produce stored at optimum low temperature conditions and hypobaric conditions

Name of produce	Storage life (days)	
	Optimum low temp.	Hypobaric/low temp.
Capsicum	16-18	50
Cucumber	10-14	41
Green onion	2-3	15
Sweet corn	4-8	21
Lettuce	14	40-50
Tomato/mature/green	14-21	60-100
Tomato Breaker's stage	10-12	28-42
Banana 'Valery' var.	10-14	90-150
Pear	45-60	300
Apple	60-90	300
Lime green tahiti	14-35	60-90
Pineapple	9-12	40
Grapefruits	30-40	90-120
Strawberries	5-7	21-28

(D) Packing of some fresh produce

Fresh produce selected, sorted, graded, treated and handled carefully needs suitable and strong package for protection during transportation and storage. It has to be economical, harmless, simple to pack, convenient to handle, to take up little space and must withstand handling, weather conditions and when stacked must support the full weight of stack under high humidity, low temp. and vibration stress. For packing containers, wood and fibreboard materials are of choice. Presently plastic crates have entered the fresh produce trade. Cartons do not have the same stacking strength as wooden cases when they absorb moisture the strength decreases. Plastic crates are strong and last long but initially cost more. Traditional packing of fresh produce in gunny bags, palli cloth, baskets and pilfer proof wooden boxes is now gradually replaced by plastic crates/cartons/modified baskets, bulk bin, etc. Packing of potato and onion in gunny bags will continue. Produce other than potato and onion in gunny sacs will face severe damage while handling. The corrugated carton from cardboard can be precut to any size and assembled and stored flat. This is also less injurious to produce. The contents in the wooden box can be lost if broken but not from the carton. The impact made on the wooden box is passed on to the produce and in the process contents get damaged. However, cartons absorb impact and little damage is caused to the produce. The wire bound crates are suited for packing melons and some vegetables. The disadvantage with wirebound crates is that they telescope during transportation. The produce is packed in bulk bins with a capacity to hold 250-500 kg. The produce such as cauliflower, radish, topped carrots, spinach in small bundles, apple, orange, etc., may be packed with some order in large bins and transported. The produce in the bulk bins may be stored at low temperature as long as required and thereafter the produce is removed and inspected and packed in convenient containers and sent to retail outlets. Transportation of produce

in bulk containers results in less moisture loss and wastage besides saving time on packing in the field in individual containers. The packages suggested for different fruits and vegetables are as under:

Plastic crate:

60 cm (l) x 39.5 cm (w) x 25.5 cm (ht) to hold maximum of 20 kg of produce. Such plastic crates can be placed 30 in the pallet lengthwise in 3 rows and 2 rows widthwise and stacked on top of each other upto 6 high. Pallet dimension may be 120 cm x 110 cm. The pallets are forklifted and stacked into cold rooms or storage rooms.

Corrugated cardboard cartons

For Apples: One piece corrugated cardboard carton 51 cm (l) x 30.5 cm (w) x 28.5 cm (ht). Trays with 20 and 25 cavities to place apples of 75 mm diameter and between 65-70 mm diameter apples respectively. 4 trays can be accommodated in the container. Cartons are provided with holes.

For Banana hands:

Two piece telescopic type and made of corrugated cardboard carton with dimension 56.25 cm (l) x 30 cm (w) x 22.5 cm (ht) to accommodate 12.5 to 13 kg of banana hands. The carton is provided with ten half inch holes and side grooves for lifting.

For Mandarin oranges:

One piece corrugated cardboard carton with size 47 cm (l) x 28 cm (w) x 28 cm (ht) and provided with 4 holes of 1.25 cm diameter along the length on each side of the container. A groove is provided at each end for easy lifting. One hundred oranges of 2 to 2-1/2 inches diameter can be packed 25 in each layer and each layer is separated by a hard card board 46 cm (l) x 26.6 cm (w). The carton is closed with side flaps and sealed with gum tape.

For Grapes:

Corrugated cardboard carton of size 39.5 cm (l) x 30 cm (w) x 11.5 cm (ht); small holes of 1/4 inches size may be provided on all sides at the rate of two quarter inch holes per half kg of grapes for ventilation. The container has the capacity to hold 4.8-5.8 kg of grapes. Sulfur treated paper may also be placed on grapes in the container.

For Sapota:

Carton size, 32.5 cm (l) x 22.5 cm (w) x 11.25 cm (ht) and each carton is provided with 2 quarter inch holes on each broad side for ventilation and the quantity packed in each carton will be 4 kg provided the sapota are uniformly graded.

For Potato:

Coarsely woven gunny sacs to contain not more than 80 kg and they are stacked in the cold room in a chimney like fashion for better aeration and movement.

For Onion:

Netted gunny sacs to contain not more than 40 kg and they are stacked in chimney like fashion for better aeration.

Plastic crate can be used for all vegetables and fruits.

(E) Transportation and handling of the cold stored produce

Quick transport of produce from the farm/field to the packing shed or house is the need of the hour as the time taken between harvesting and storage at its optimum cold storage conditions should be minimum for long term storage; otherwise delay between harvesting and storage at low temperature will reduce the storage life. Delay of one day for apples in cold storage will shorten its storage life by one week. Normally the produce is transported by rail, road for internal trade and by sea and air for export purposes.

Trucks and railway wagons used for transport of fresh produce are of the following types: (a) Non-refrigerated, (b) Refrigerated-fitted with a refrigeration unit (c) Ice Bunker - arrangement for cooling with ice and (d) Refrigerated container (10 to 25 tonne capacity) mounted on the chassis of the

truck or rail road and shipped by sea. Safe transportation of banana bunches, hands in crates or cartons, apples in cartons, oranges in containers, sapota in cartons, grapes in plastic crates or cartons have been worked out commercially and the information is available with the author. Procedure for stacking the cartons with produce in the refrigerated containers for long distance transport has been worked out in detail for some Indian fruits and vegetables.

The advantages of transporting produce in refrigerated containers are many as the produce remains fresh, free from decay and any discolouration or disorder when properly processed and assures longer life when stored at required low temperature. Once the produce is cooled to the required temperature, it must continue to be transported at that temperature only, otherwise fluctuations in the temperature will cause adverse physiological changes in the produce.

The two way refrigerated container transport system, if developed in India with available resources and tested for transporting the produce from the North to South, East or Western parts of India in excellent condition with minimum moisture loss and decay and from the South, East and Western parts of India to North in excellent condition, it will link all important cities/towns of the States of Indian Union and promote fresh trade to the advantage of the growers' and Growers' Co-operatives. Refrigerated transport by container of the fresh produce to any part of the world is now feasible by sea. This system will establish cold chain in India.

(F) Packing house operations

For commercial handling and storage of fresh produce, packing house is the need of the hour. Packing house should be equipped with the following:

- * Platform for receiving the crates with produce, chain conveyor, etc.,
- * Feeding tank or hydrohandling equipment for some produce
- * Elevator pre-sorting table
- * Presizer
- * Sorting/Inspection table long chain conveyor/belt conveyor/etc.
- * Evacuating belt conveyor for second quality
- * Washer cum brusher unit
- * Waxing unit
- * Drying tunnel
- * Roller distributor
- * Mechanical cup sizer
- * Sized product collecting belt
- * Empty box feeder from the cleaning crate unit
- * Box filler
- * Full boxes collecting belt
- * Scales
- * Full boxes evacuating conveyor
- * Pallets
- * Cold storage rooms and ripening rooms

Designing of the packing house is important, depending upon the quantity of fresh produce to be processed and also the equipments will vary depending on the type of fresh fruit or vegetable.

Concluding Remarks

India produces 75 million tonnes of fresh fruits and vegetables but the produce of one part of the country does not reach in good condition to the other part of India situated far away or over 1000 kilometers. Thereby, the produce is either sold at throw away or distress prices or wasted in that part of the country due to glut. If refrigerated containers are used for transporting the fresh produce from one part of India to another part situated far away over 1000 kms, it will ensure delivery in excellent condition and will result in good returns to growers of that region. This will certainly establish the cold chain in the country. For this system an organized approach is necessary by setting up proper Packing Houses equipped with sorting, grading, treating, packing equipments and cold storages for commercial handling operations. This will usher India into joining the World's most advanced system in fruit and vegetable trade.

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Quality Control and Inspection of Spices and Spice Powder for Export

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INTRODUCTION

For ensuring safety and health of the citizens while consuming food items, legislations have been the first step introduced by all Governments. Some of the legislative measures enacted in India in this direction are :

1. Agricultural Produce (Grading & Marking) Act, 1937
2. Prevention of Food Adulteration Act, 1954
3. Fruit Products Order, 1956
4. Bureau of Indian Standards Act, 1986
5. Export (Quality Control & Inspection) Act, 1963

Majority of these legislations are aimed at manufacturing/producing/distributing food items under hygienic conditions. Many of these legislations are mainly meant for production and distribution of food items for local consumption though the regulating agencies are different.

Agricultural Produce (Grading & Marking) Act, 1937, the base legislation empowers Government of India to formulate standards and to carry out grading for quality control programmes for agricultural and allied products. The General Grading & Marking Rules, 1937 as amended in 1988, and further supplemented by specific commodity grading and marking instructions facilitate implementation of the provisions of the Act. These standards have been made applicable to export also. The Agmark standards stipulates common physical and chemical parameters like odour, size, colour, extraneous matter, damaged kernels, or pieces, mould and insect infestation, immature and discoloured kernels or pieces, admixture, bulk density, moisture level, total ash, acid insoluble ash etc. Keeping in view of the requirements of the sophisticated import markets, the standards have not been revised and made upto date.

Government of India, Ministry of Commerce, in exercise of the powers conferred under the Export (Quality Control & Inspection) Act, 1963 has notified the following commodities under the Act and Export Inspection Agencies (EIA) have been authorised to carry out the pre-shipment inspection.

1. Black Pepper (Whole or Ground)
2. Cardamom, Cardamom seeds and Powder

3. Curry Powder
4. Fennel, Fenugreek and Celery seeds
5. Cumin Seeds
6. Corriander
7. Ginger and Giner Powder
8. Turmeric and Turmeric Powder

BLACK PEPPER

Black Pepper is the major item among spices. Consignmentwise inspection and In-process Quality Control (IPQC) have been recognised. Minimum infrastructure for pepper processing units has been specified in the Notification. As per the Memorandum of Understanding (MOU) between the Government of India and USFDA, Export Inspection Agencies have been authorised for inspection of black pepper for export to USA. There is a separate sampling plan, method of analysis and certification procedure for inspection and certification of Black Pepper for export to USA.

Food Defect Action Level (FDAL) for Black Pepper and Ground Pepper

	Defect	Action level
Whole	Insect filth or mould	Average of 1% or more pieces by weight insect infested and or mouldy
	Mammalian excreta	Average of 1 mg. or more of mammalian excreta per pound
	Foreign matter	Average of 1% or more picking and sifting by weight
	Microbiological Contamination	Presence of Salmonella/ Arizona
Ground	Insect filth	475 or more insect fragments per 50 gm.
	Rodent filth	2 or more rodent hair fragments per 50 gm.

PESTICIDE RESIDUE

The tolerance limit for pesticide residue is established by the Environmental Protection Agency (EPA). In the absence of tolerance or tolerance exemption, FDA may establish action levels.

<u>Pesticide</u>	<u>Tolerance Limit</u>
Aldrin	0.05 ppm
Dieldrin	0.05 ppm
BHC	0.05 ppm
Chlordane	0.01 ppm
DDT	Not permitted

GOOD MANUFACTURING PRACTICES

Compliance of DAL does not excuse violation of the requirement that food not be prepared, packed or held under insanitary conditions. The food should be manufactured, packed and held in sanitary condition. The ASTA and USFDA give importance on "Clean Spices", not on "Cleaned Spices".

FAIR PACKAGING AND LABELLING ACT

This is applicable in the case of pepper packed in retail/consumer packs.

Colour, size, light-berries, density, moisture content, presence of extraneous matter damaged berries for black pepper and for ground pepper, moisture content, total ash content, acid insoluble ash and crude fibre, freedom from admixture, mould growth, insect infestation and musty odour are included in the grade specification.

USA is the main buyer of black pepper. Black Pepper should meet ASTA specification and USFDA requirement.

ASTA CLEANLINESS SPECIFICATION

ASTA cleanliness specification for processed spice are part of ASTA's import contract. These specifications are not substitute for the Federal Food, Drug and Cosmetic Act of FDA (requirement). Bulk of sampling and inspection are carried out by ASTA under conditional release without formal FDA inspection. The importers in turn guarantee that Spice Consignment found to be adulterated is returned or properly cleaned or reconditioned before allowing for distribution.

The ASTA specification prescribe limits for extraneous matter which is removable under good manufacturing practices. Extraneous matter is defined as foreign matter to the product and includes but not restricted to stones, dirt wire, stems, sticks non toxic foreign seeds, excreta manure and animal contamination.

Limit of contaminants under ASTA specification for Black Pepper

Whole dead insects by count	Excreta mammalian mg/lb	Excreta others mg/lb	Mold by % wt.	Insect defiled % by wt.	Extraneous matter % by wt
2	1	5.0	1	1	1

USFDA REQUIREMENTS

FDAL established by the USFDA, which is defined as the extent of natural defects, that is not possible to completely avoid in agricultural product, are limits at or above which FDA will take legal action against the product.

Cardamom, Cardamom seeds and powder are subjected to Quality Control under the Export (Quality Control and Inspection) Act, 1963. Minimum standards have been prescribed for these items. Consignmentwise inspection and Inprocess Quality Control have been recognised as systems of inspection.

Fennel

Cumin Seeds

Corriander, Fenugreek, Celery Seeds

Ginger and Ginger powder

Turmeric and Turmeric powder

The standards prescribed by AGMARK are enforced. Whenever additional requirements are specified by the buyers it is also enforced.

USFDA FOOD DEFECT ACTION LEVEL

<u>Product</u>	<u>Defect</u>	<u>Action level</u>
Ginger	Insect filth and/or mould (MPM-V32)	Average of 3% or more pieces by weight are insect infested and/or moulds
	Mammalian excreta (MPM-V32)	Average 3 mg. or more of mammalian excreta per pound
	Foreign matter/ Extraneous matter	Average 1% by weight
Cardamom	Mammalian excreta (MPM-V32)	Average 3 mg. per lb. or more of mammalian excreta
	Insect filth and/or mould	Average 1% mould by Wt. Insect defiled/infested
	Foreign matter Extraneous matter	Average 1% or more Extraneous matter by Wt.

<u>Product</u>	<u>Defect</u>	<u>Action level</u>
Turmeric	Excreta mammalian (MPM-V32)	Average 5 mg. or more per pound
	Mould	3% or more by weight
	Insect defiled or infested	Average 2.5% by weight or more
	Foreign/extraneous matter	0.5% by weight or more

Cumin Seeds	Sand & grit AOAC 44.124	Average of 9.5% or more ash and/or 1.5% or more acid insoluble ash
Fennel Seed	Insects (MPM-V32)	20% or more sub-samples contain insect
	Mammalian Excreta (MPM-V32)	20% or more sub-sample contain mammalian excreta or average of 3 mg. or more of mammalian excreta per pound.
Celery	Mammalian Excreta (MPM-V32)	Average 3 mg. or more of mammalian excreta per pound

CURRY POWDER

Curry powder is a product of judicial blend of special spices, the number of ingredients varying from 5 to 20 depending upon the end use. In addition to the spices, specialised flavours and blends, starch, bengal gram and salt are also added to improve the taste, consistency and for preservation.

Global trading of curry powder is estimated at 6000 tonnes per annum. India and UK are the two main countries manufacturing of curry powder. 65% of the world production of curry powder is controlled by India and UK. The quality of the Curry powder depends upon the various blends of spices, the overall volatile and oleoresin contents, granularity and other physio chemical characteristics. Hardly less than 10% of the spices is converted in the form of curry powder. With the increased demand of curry powder, and at the annual growth rate of 9%, India's target is to export 6000 tones of curry powder by 2000 AD.

To achieve the target it is necessary that the changing global requirements of standards are met. Apart from minimum standards prescribed in AGMARK and PFA Act (India), to cope with the emerging challenges of the importing countries it is necessary that new technology for the manufacture of curry powder and modern testing methods need to be adopted. The standards of AGMARK and PFA are :

AGMARK STANDARD

	Standard	General
Min. Spice content	85%	70%
Moisture (Max.)	10%	10%
Salt (Max.)	5%	10%
Volatile oil (Min.)	0.25%	
Non-volatile ether extract (Min.)	7.5%	
Acid insoluble ash (Max.)	1.0%	
Crude fibre (Max.)	15%	
Lead (Max.)	10 ppm	10 ppm
	(Revised as 2.5 ppm)	

PFA STANDARD

Moisture	Not more than 14%
Volatile oil	Not less than 0.25%
Non-volatile ether extract	Not less than 7.5%
Edible salt	Not more than 5%
Acid insoluble ash	Not more than 2%
Crude fibre	Not more than 15%
Lead	Not more than 10 ppm

The label should show ingredients in descending order of quantity. The spice content should not be less than 85% and should be free from dirt, mould and insect infestation and should not contain added colours or Class II & III preservatives.

USA is one of the main buyers of Indian Curry Powder. US FDA has stringent specification for filth and other insect infestation in any food material raw or processed, imported into the country. Defilement of food by pest or contamination by other sources render the food adulterated. The presence of macroscopic, microscopic or insect damaged, mouldy and animal contaminated, rancid, dirty and unhygienic material render the product adulterated under Section 4.2 (a) 3 of the FD & C Act. The defect action level set-up by USFDA for curry powder is given below:

Defects	Defect Action Level
Insect filth (AQAC 44.124)	Average 100 or more insect fragments per 25 gm.
Rodent filth (AQAC 44.124)	Average 4 or more rodent hairs per 25 gm.

Japan is another important buyer of curry powder and Japan's Curry Powder manufacturing industries are the largest user of imported spices. According to Japan Curry Powder Manufacturer's Association, Japan use about 80,000 tonnes of imported spices for instant curry production. Indian spices, are also imported and cleaned and used for curry powder manufacture. In addition to other parameters stringent bacteriological standards are also laid down for curry powder.

JAPAN STANDARD FOR CURRY POWDER

	n*1	c*2	m*3
APC	5	3	10 ⁵
Total coliform	5	3	100
E. Coli	5	2	10
Salmonella	5	ND	ND
Mold	5	2	10 ²

*1 No. of samples to be tested

*2 No. of allowable defective samples

*3 Max. tolerance allowed.

EEC Countries : India continues its prominent position in the export of curry powder to EEC countries. Curry

powder export to EEC countries increased from 1312 MT valued US\$ 1265000 in 1986-87 to 1763 MT valued US\$ 1766000 in 1990-91. Among EEC countries, Germany has been the single largest market for Indian Spices followed by France, Netherland, UK, Italy, Belgium, Luxumburg, Spain and Denmark.

With 400 million consumers, the unified EC will be a powerful trading block in future. Harmonised European Standard has not been formulated so far. For spices including curry powder, Germany the biggest importer prescribed standard for curry powder as:

Moisture % (Max.)	9
Total ash % (Max.)	7.2
Pass through particle	
Size % of (Min.)	95
Sieve number	30

There is also a need to control levels of pesticide residue and restrict the microbial load in tune with the specification of the member countries. Among the member countries Germany and Netherland have ones for stringent standard for pesticide residue. Indication are that there will be demand for organic spices from the European Market.

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RAW MATERIALS

312 Resurrection of kesari

Scientists at IARI, headed by S.L. Mehta, grew tissues like the leaves, roots and bits of the kesari dhal plant in a special nutrient medium. They then regenerated the plants from these tissues, thus establishing several plant-lines. Biochemical tests on these plants showed that some plant-lines contained very little toxin while others such as those grown in the fields contained much more!

The scientists have also isolated a micro-organism that has a gene capable of breaking down the poison in kesari dal. They hope to transfer the gene into the kesari plant, so that the dal should be free of the poison.

If the project is successful, the poor Indian would be able to enjoy this cheap and nutritious delicacy again, without fear.

(Deccan Herald 21 September 1992)

STORAGE AND INFESTATION CONTROL

313 Silos for grain storage

The Agro Division of Shirke Structural Pvt Ltd undertakes to design, manufacture and install GIC grain storage silos on a turn-key basis. The silos are fully constructed from steel made in India. The shell wall is strengthened by use of thick sheets duly sheared, corrugated, punched, bent, and then galvanized. Silos are further supported by strong stiffeners. Galvanizing is done after holes are punched to make them totally rust-proof. Since the stiffeners are provided on the outside, there is no deterioration in the quality of grain. The roof is made stronger by the use of heavy rafter sections. Perfect sealing by strong nuts and bolts and a special type of sealant makes the silo joints leak-proof. For further information write to: Shirke Structural Pvt. Ltd., Agro Divn, 72-76 Mundhwa Industrial Estate, Pune, Maharashtra 411 036.

(Industrial Products Finder 20(11), 1992, 187)

314 Dome system for bulk storage

SIT Agro Industrie of France has developed a dome system for bulk storage of chemicals, grain, sugar, potatoes, fruits and vegetables. Dome system is

cheaper and faster than traditional construction even with more or less moderate soil conditions through a better load dispersion enabling to avoid pile foundation. It is leak free and can be insulated for cold storage quality with low maintenance costs. For further information write to: Classic Polymers and Resins, 4 Devdarshan, Mugal Lane, Mahim (W), Bombay 400 016.

(Industrial Products Finder 20(11), 1992, 46)

FOOD ADDITIVES

315 Technology for concentrated invert sugar syrup

Bhabha Atomic Research Centre (BARC) has developed a process for enzymatic production of concentrated invert sugar syrup. The process, involves continuous enzymatic production of concentrated invert sugar using cell immobilisation technique under controlled process conditions. The technology is simple and continuous, and produces invert sugar syrup having excellent storage properties. This process does not lead to any down stream pollution problem.

The invert sugar syrup is a valuable sweetener in food and pharmaceutical industries. Compared to sucrose, it possesses functionally more desirable properties like low cariogenicity, high osmotic pressure and high solubility.

At present, the requirement of invert sugar syrup is met partly through the conventional acid hydrolysis route which gives rise to inferior quality product, in addition to posing waste disposal problem. Because of this, many industries are importing the invert sugar syrup in order to meet their requirements.

(BARC Newsletter No. 104, August 1992)

316 MSG replacer enhances flavor

A new flavor ingredient from US-based Provesta Corporation will make its European debut at FIE '92. Provesta 46-113 enhances flavor and is a price competitive replacement for MSG.

Sensory analysts evaluated a test potato bisque (soup) sample made with 0.26% of Provesta 46-113, and a sample containing 0.35% MSG, along with a control. Results indicated the Provesta test had a flavor profile and mouthfeel analogous to the MSG soup sample.

Comparison of the Provesta test with the control soup verified Provesta 46-113's ability to enhance flavor. It significantly improved the overall, butter,

black pepper and salt flavoring. For further information write to: Provista Corp., 15, Phillips Bldg., Bartlesville, OK 74004.

(*Food Engineering Int'l.*, September 1992, 68)

317 Natural sweetener produced using bioengineering

Two research groups at the University of Tokyo and Yokohama National University have successfully identified the gene of a sweet protein (curculin) contained in the fruits of *Curculigo latifolia* - subtropical plant growing in India, Malaysia and neighbouring countries. They incorporated the gene into colites germs, thus propagating them in large quantities and producing the targeted protein.

The genetically engineered protein takes the form of polypeptide monomer and needs to be changed into dimer to have the desired level of sweetness.

The research groups aim to pioneer a commercially viable production method in partnership with Asahi Denka Kogyo Co. A potential application of curculin is a substitute for sugar: it may be used for preventing tooth decay and diabetes and employed as a diet-use sweetener.

The product yet to be applied to food in Japan. Curculin is capable of turning sour products into sweet ones. The above-mentioned fruit has been used for modifying taste for a long time.

(*Chemical Weekly* 37(50), 1992, 168)

PROCESSES

318 Nitrate free water

A clean process for removing nitrates from drinking water and converting them into harmless nitrogen gas has been developed in Germany.

Nitrates from fertilisers are easily washed by rain into water courses and are carried into the water supply. Nitrates have been linked with stomach cancer. Michael Sell and colleagues at Solvay-Umweltchemie, a chemicals company based in Hanover, say that the key to their system is a catalyst of palladium and copper coated onto a support material of aluminium oxide. They dissolve hydrogen gas in the contaminated water and pipe it into a chamber where it swirls around the catalyst.

The tiny particles of palladium and copper-just 0.4 millimetres across-act as anchors for the reactants, and enable the hydrogen to extract the oxygen

from nitrate ions to produce water. The nitrogen is left in the form of gas, and is piped harmlessly into the atmosphere.

Solvay says that the system is unique because it produces no waste and is largely unaffected by the acidity, temperature and pressure of the incoming water. The only additional chemical required is hydrogen gas. It takes around 50 grams of hydrogen to denitrify a cubic metre of waste water containing 60 milligrams of nitrate per litre. The researchers believe their technique is cleaner and safer than existing methods.

Sell and colleagues will soon begin work on a plant which denitrifies 10 cubic metres of water each hour, enough for a town of around 2000 people.

(*New Scientist* 8 August 1992, 18)

319 Lingering aftertaste

The taste for cheese is an acquired one. Preparing good cheese is a time-consuming process too.

A cheddar cheese for example, has to be ripened for almost a year before it is considered 'mature' enough for the market.

This means that there is an year's gap between making the cheese and selling it and this means an year's delay in profits too.

Now, M. Gassan and his co-researchers at the Institute of Food Research have announced a way to speed up the process. By genetically engineering the *Lactococcus* bacterium that is used to make cheese they can reduce the period of ripening to one month.

(*Deccan Herald* 21 September 1992, X)

320 Coconut as soft drink

A coconut water soft drink may hit Indian soft drink market soon.

Dr. V.T. Markose, Chief Coconut Development Officer in the Coconut Development Board, Kochi, told the 29th meeting of the Permanent Panel on Coconut Technology of the ASEAN and Pacific Coconut Community, which began its five-day session here today, that a process to bottle coconut water from matured nuts and to standardise it to the level of soft drink had been perfected by the Regional Research Laboratory at Thiruvananthapuram in Kerala.

Test marketing of this new product in some of the Indian cities had proved encouraging, he said.

Dr. Markose said around 10 per cent of India's total production of 10 billion coconuts per annum was consumed as soft drink in the country.

Of late, tender coconut is gaining popularity because of the consumer preference towards natural drinks vis-a-vis the synthetic ones. Pricewise too, the difference between synthetic soft drinks and tender coconut water is negligible. The slight edge of synthetic drinks over tender coconut water being that the former is available in attractive consumer bottle and can be preserved for longer periods.

(The Times of India 4 August 1992, 17)

EQUIPMENT AND MACHINERY

321 Bag-in-box coffee system

Commercial outlets that serve coffee now can brew more than 400 cups of fresh coffee in minutes with no filter preparation, cleanup or waste, via a unique package and dispensing system - EasyBrew - from Douwe Egberts Coffee Systems, Schaumburg, Ill., a division of Sara Lee Corp.

Fresh 100% Columbian coffee is immediately deep-frozen in the Flexi-Pak using a strictly controlled blending, brewing and concentrating process. Flexi-Pak, a patented, fully disposable bag-in-box container, is placed into the coffee dispenser, and the coffee is ready to fill as few as one or as many as 600 cups.

The EasyBrew system features dispenser operated by a patented dosing system. Coffee is made fresh on demand, while allowing the operator to pin-point coffee strength.

EasyBrew provides fresh coffee in a source-reduced form. Two EasyBrew Flexi-Paks leave only 15 oz. of disposable waste compared to 30.6 pounds for conventional coffee machines.

(Prepared Foods March 1992, 99)

322 Bag filling system

Weighpack, a designer of automatic and semi-automatic bag filling systems, has introduced a compact and light-weight electro-pneumatic bag filling system suitable for bagging almost all free flowing food grains and similar other products. It is offered according to particulars of packing, bulk density, output required per shift, quantity to be packed in each bag, size and type of bags used for packing and compressed air availability. For more details write

to: Krishna Dyeing Compound, 46 Dr. S. Radhakrishnan Road, Andheri (East), Bombay 400 069.

(Chemical Products Finder 11(2), 1992, 88)

323 Powder filling machine

This machine is an auger filler which is more suitable for filling powders which are free flowing like chilly powder, turmeric powder, powdered spices, cocoa, skimmed milk powder, masala powders, soft drink powders, food colours and pharmaceutical powders. Auger filler is volumetric powder filling machine which is most suitable for filling free-flowing and semi free-flowing powders into any type of container. It is faster and more consistent when it comes to handling fine, free flowing powders, than weight filler. The different models can cover a filling range from 100 mg to 500 grams with filling speeds from 900 fills to 2,500 fills per hour. In this machine a vertically rotating auger of screw doses out the required quantity of powder directly into the pouch or container. The quantity of powder dosed out depends on the auger diameter, the pitch of the auger and the number of times the auger rotates inside the hopper. An electronic solid-state feed controller which is plugged into the machine, controls the auger revolutions and thus the dose. By interchangeable augers and funnels the filling range can be spread out nearly 10 times from minimum to maximum. The weight of the powder delivered is nett. The machine can fill into any type of container. Dusting is negligible when filling. The machine is simple to set up and run and occupies very little floor space. Production of over 10,000 fills is possible in a 6 hour shift. For more details write to: Automatic Devices, 105-A, Hind Saurashtra Industrial Estate, Marol Naka, Bombay 400 059.

(Chemical Products Finder 11(2), 1992, 95)

324 Packaging machine

The Winpac-A 2400 from Wintech Industries is a versatile machine suitable for packaging a variety of products. A roll of heat sealable film is mounted on the rear of the machine. The film is formed into a tube and sealed vertically. One simultaneous operation seals the film tube at the lower edge, fills it, seals at the top and cuts off. Polythene film is sealed and cut with a horizontal sealing electrode. For guillotine or perforation a reciprocation knife arrangement can be provided. Various systems are available depending on the type of product to be handled. The entire operation is fully automatic and electronically controlled. The machine is of robust construction. All contact parts are made from stainless steel. Models built in complete stainless steel

are also available. The machine is useful for packaging milk, ghee, vanaspathi, masala, fruit juices, tea, oil, spices, flour and coffee. Wintech Industries manufactures a wide range of fully automatic, semi-automatic, and manually operated packaging machines, blister/skin packaging machines, shrink wrapping machines, and hand/foot operated sealing machines for plastic bags. For further information write to: Wintech Industries, 15-A Nehru Street, Srinivasa Nagar, Padi, Madras-600 050.

(Industrial Products Finder 20(11), 1992, 144)

325 Machine Packages liquids in cartons

New from Cheery-Burrell Packaging Equipment Division, the Gable Top Packaging Machine forms, fills, and seals pasteurized products in gable top cartons. Ideal for dairies, juice processors, and liquid food companies, it handles various products intended for refrigerated distribution. Features include quick carton changes, reduced product tank condensate, easy cleaning, and stainless steel construction that resists caustics, sanitizers, and citric and lactic acids. It handles sizes from 200 ml to 2 litre at a wide range of speeds. For further information write to: Cherry-Burrell Packaging Equipment Div., 2400 Sixth St. SW, Cedar Rapids, IA 52406, U.S.A.

(Industrial Products Finder 20(11), 1992, 162)

326 Easy to operate juice extractor

Model 1200 E Continuous Extractor continually removes juice from fruits and vegetables without any batch operations or the associated labour. Featuring the advanced belt press technology used by large companies, it is ideal for small and mid-sized juice producers. This extractor also comes in large models. For further information write to: Frontier Technology, Inc., 2920 NW 67th Ct, Fort Lauderdale, FL 33309, U.S.A.

(Industrial Products Finder 20(11), 1992, 125)

327 Electronic Vegetables

Engineers at the Scottish Centre of Agricultural Engineering at Penicuik, South of Edinburgh, have developed devices which record forces involved in the handling of fresh food products such as potatoes, apples, tomatoes, etc. The devices known as "electronic vegetables" have force-sensitive inner skins, and microelectronics contained within the process store the record of impacts during handling.

The submersible device is ideal where the produce is washed. Every impact during the process is monitored and the maximum value is stored.

Then there is a pin-point detector which records the time of the largest impact, making it ideal to determine where exactly major damage occurs in the handling system.

(Business World 26 August - 8 September 1992, 103)

328 Food Extruder

The Food Extruder from Esskay Enterprises is engineered for continuous cooking of speciality processed food products such as protein-rich ready to eat snacks, breakfast cereals, and textured soya proteins. The extruder is equipped with manual operation and with semi-automatic regulation system of extrusion cooking for increasing performance efficiency and versatility in operation. The semi-automatic control includes digital temperature indicators for each of the heads, rotameter, push-buttons, steam pressure controls, steam gauges, and calibrated dials for variable speed drives. These controls can reduce the demand of skill level of the operators. The actual production capacity of this extruder depends on bulk density, texture and such other requirements in the finished products. For further information write to: Esskay Enterprises, 53 (20/1) Infantry Road, Bangalore, Karnataka 560 001.

(Industrial Products Finder 20(11), 1992, 4)

329 Fluid bed dryer

The Stork Protecon Sequential Batch Fluid Bed (SBFB) Dryer is said to be breaking new ground in the dehydration of meat, vegetables, pellets and many other snacks and ready meals.

Even deep frozen meat can be dried at temperatures down to -15 C. Meats are first cooked at low temperature (to maintain flavor and structure), dried, then cooled in a continuous operation that takes slightly over an hour.

In contrast, Stork's new SBFB Dryer achieves fluidization of up to 20 cm of material compared to 10 cm in the normal system. This allows increased air velocity and dramatically improves heat transfer, according to Stork. Up to seven times the efficiency of conventional drying systems is claimed.

The SBFB meat drying system is divided into three basic stages. At each stage the dwell time, air temperature and air velocity can be fine-tuned for different products. The process starts by breaking up and grinding the material (mixing extra ingredients such as collagen fiber is also possible here). The product is then cooked in a controlled environment.

Before entering the second stage, the product is once again ground and then dried at a lower temperature. In the last drying/cooling stage, the

remaining moisture is driven off to leave a dehydrated product ready for packaging. As the dryers are computer-controlled, operation is simple and efficient, with just two or three operators required.

The complete installation is filtered to release only 'clean steam into the atmosphere, so it is environmentally friendly and pollution free. Much of the hot air is recirculated, making it an energy efficient system.

Particular benefits are claimed in areas where: low temperature cooking is required; the material has a high moisture content (above 80%); and the material goes through a sticky phase in its drying cycle.

For details contact: Stork Protecon BV, P.O. Box 292, 5340 AG, Oss, The Netherlands.

(Food Engineering International September 1992, 34)

330**New tray for papain collection**

Traditionally, the heavy-aluminium trays are used for papain collection. They are costly (Rs. 250 a tray), needing more time and labour while fixing and removing from the plants. For fixing these trays 4 bamboo or wooden sticks are used as support for the 4 corners. The eyes of the two halves are secured with rope around the trunk.

The new tray developed at the Tamil Nadu Agricultural University, Coimbatore, is convenient to fix and remove from the papaya trunk. The identical or symmetrical parts of the tray are fixed to the plant by a flexible curved-sheet metal clamp or fixture and a canvas strap or rope.

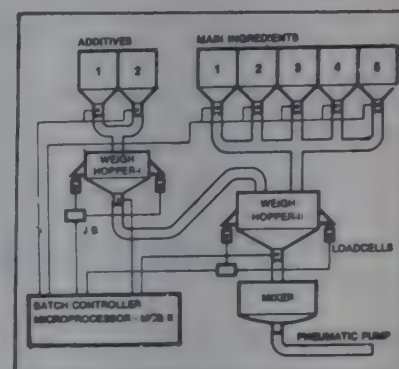
Made of 3 mm MS rod, the tray consists of a pair of rectangular framed structures. The frame can accommodate a nylon or polythene sheet fixed either by stitching or clips. The frame has a curved portion and curved or flexible sheet-metal clamp. A canvas strap is used to hold the pair of frames to provide a horizontal platform lined with nylon or polythene sheet, on which papain is collected.

The new tray has completely overcome the constraints of the traditional one. It is light (500 g), easy to fabricate and gets fixed or removed within a minute. A tray costs Rs.20. For further information write to: K. Rangaswamy, R. Karunanithi, D. Manohar Jesudas and K.R. Swaminathan, College of Agricultural Engineering, Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu) 641 003.

(Indian Horticulture 37(1), 1992, 24,27)

331 Batching and weighing system for food and beverages industries

Static Power Systems (P) Ltd. offers microprocessor based batching and weighing controller for the food and beverages industries. The additives and main ingredients are stored in tank or silos and they are selected automatically by microprocessor unit as per the recipe requirement. Automatic taring, batching and time sequence are governed by the microprocessor unit. The weighed material ultimately is transferred into mixer or pumped to other vessel as per the requirement. Micro-processor controller displays, weighed material, gross and net weights, number of batches, etc. This controller also can be programmed as per user's requirement. Microprocessor controller is highly accurate and guards the systems against any mechanical or electrical faults. For more details write to: Static Power Systems Pvt. Ltd., D-147 Bonanza Industrial Estate, Ashok Chakravarty Road, Kandivli (East), Bombay 400 101.



(*Chemical Products Finder* 11(1), 1992, 84)

332 Food machinery oil

Tribol offers food machinery oil with high performance lubricating characteristics in three types of viscosity for a broad range of food machinery applications. The Molub-Alloy 823 FM grease and special high temperature grease Molub-Alloy 9830 are approved for applications where incidental food contact may be possible. Molub-Alloy 9830 can also be used as a sliding safety agent in oxygen installation. These lubricants with antiwear-properties can provide longer continuous trouble-free service in brewery, bakery, cannery, dairy, beverage and other food industry applications. For more details write to: Tribol GmbH, Erkelenzer StraBe 20, D(W)-4050 Monchengladbach 5, Germany.

(*Chemical Products Finder* 11(1), 1992, 115)

333 Potato wafers plant

The Ajit Brand Potato Wafers Plant comprises of the drying machine, slicing machine and peeling machine. This plant has the capacity of 100 kg of potatoes per shift of one hour. The plant is ideal for the cottage-industry. For further information write to: Ajit Manufacturing Co., Dhebarbhai Road, Opp Bhutkhana, Rajkot, Gujarat 360 001.

(*Industrial Products Finder* 20(10), 1992, 59)

334 Peel and chop

Fruit and vegetables come in all shapes and sizes, making peeling, slicing and chopping on an industrial scale difficult.

Dornow, a German company that manufactures a range of equipment for vegetable processing, recently developed a line of mechanical peelers that produce no waste water. These machines also have a "clean air" option that blows filtered and purified air into the peeling chamber to reduce the possibility of spoilage of the peeled produce.

A range of peelers is available to suit individual needs. The OW Series can peel potatoes, carrots, beetroot, celeriac, radishes, and many other types of vegetables without creating waste water. The waste is 100% peelings - easily utilized for other purposes - and waste water treatment costs are eliminated.

Others in the range include the drum roller peeling machine (T-series), and is suitable for peeling very small potatoes and carrots; and carrousel peelers, which are available with two, three, four or more peeling stations. Depending on the size of the system, outputs range from 500 to 1,500 kg/hour where pre-peeling is done separately, and 400 to 1,200 kg/hr with integrated pre-peeling. Patents are pending on all these machines.

When it comes to chopping, dicing, or cutting into strips, Urschel Laboratories has a wide range of machines suitable for fruit and vegetable preparation.

One of the latest developments is the Model VSC, which the company has now patented. It is a versatile machine capable of making segments, slabs and square or rectangular strips from a variety of foods including carrots, pickles, zucchini (courgettes), and potatoes.

(Food Engineering Int'l., June 1992, 62)

PACKAGING

335

Acquiring a taste of nitrogen

Nitrogen is now being used in liquid form to preserve packaged food without the use of chemical additives.

Aga, the Swedish gas company, has developed a process of injecting the liquid during the packaging process.

The process could be used with any food which comes in a sealed package and deteriorates in the presence of oxygen such as peanuts, sauces or even cosmetics.

With the Linject process, originally developed for the drinks market, a measured amount of liquid nitrogen, at a temperature of minus 196 C, is added to the package. As the liquid nitrogen evaporates its volume increases by 700 times.

By allowing the partial evaporation of the nitrogen before sealing the container, the gas pushes out any oxygen, forming an inert environment for the food, and so increasing its shelf life. The container also becomes stronger due to the internal pressure. For details contact: Aga, Sweden, 08 731 1000. (*Venture India May-June 1992, 7-8*)

336 Laminated jute bags for tea

Rectangular shaped jute bags with top zip for easy opening and closing have been developed by M/s. Duncans Tea Ltd., for bulk packaging of tea.

The 300 gauge HDPE film is laminated to the jute fibre. A handle is stitched to the top flap during formation and flaps are preprinted. Bulk transport bags are suitable for road and rail.

Some of the benefits of the PE lined bags are greater protection, visual appeal, convenience, originality and economy.

The "Bonus" bags are cheaper than seven ply CFCS by Rs. 4 to 5 per pack. (*Food Talk 4(7), 1992, 11*)

337 Fruit, vegetables stay fresh with smart wrap

Active wrapping that can keep fruit, flowers and vegetables fresh for several weeks has been launched in Australia, reports the Australian Science and Technology News Letter.

Developed jointly by the national research organisation, CSIRO, the shipping company, Australian National Line, and the Horticulture Research and Development Corporation, the wrapping will enable growers to cut costs substantially by sending perishable produce by sea instead of using expensive air transport.

In a dramatic demonstration of its effectiveness, the Minister of Primary Industry, Mr. Simon Crean, opened a shipping container of peaches which had been 'active wrapped' four weeks earlier. The fruit was fresh, plump and juicy

and sold immediately at a Melbourne fresh fruit market. Normally peaches cold-stored for four weeks lose much of their juiciness and 'bloom'.

"Essentially, the wrapping put the fruit to sleep", Mr. Crean said. "It controls the gases surrounding the fruit so that the biological processes are greatly slowed for the duration of the voyage. The ripening process and normal plant respiration are put into suspended animation".

The material has four key elements which make it a unique packaging agent.

A permeable membrane, it is designed to let through exactly the right amount of carbon dioxide gas and oxygen to keep the product dormant. Then it is impregnated with an organic chemical that soaks up ethylene gas which is exuded by vegetable matter and hastens ripening. In addition, it keeps the air around the product very humid while at the same time removing moisture which condenses inside the package and can be harmful.

Lastly, it is impregnated with minute amounts of slow-release fungicide which inhibit mould growth.

(P.T.I. Science Service 11(13), 1992, 11-12)

ANALYSIS

338

Computerised water content measuring instrument

A Bombay-based instrument maker has introduced an electronic computerised moisture balance to measure the water content of samples in food and pharmaceutical industries quickly as well as accurately. In a significant improvement over the traditional heat lamp, the device uses a flat-plate ceramic heater which emits infra-red energy to dry the sample quickly and uniformly.

A built-in microprocessor automatically determines the dry end point and the balance displays the moisture content in grams or as a percentage of wet or dry weight. The measuring conditions can be easily changed to satisfy a wide range of applications. The key-board simplifies operations and allows convenient entry of analysis parameters.

The gadget has a number of new features which were available only in expensive imported instruments. The results can be obtained in a fraction of the time taken by the conventional method of heating in an oven.

The plate-type ceramic heater emits energy in the far infra-red range which heats the sample much more quickly and uniformly, compared to infra-red lamps or nichrome wire heaters. The long life of the ceramic heater provides years of continuous service.

It has a precise heater temperature control unit which does not overshoot the temperature set point and eliminates temperature drift, thus permitting temperature-sensitive samples to be handled safely and quickly.

The built-in micro-computer monitors the change in sample weight during drying and detects when the sample weight becomes constant. At this point, heating stops and the moisture content is calculated and displayed.

Parameters such as elapsed time, temperature, percentage moisture and sample number can be viewed without disturbing the drying process. The sample weight during drying and at user-selected time intervals, final results and a graphical representation are available through an associated printer.

The weighing capacity is up to 10 gms, the temperature setting can be done in steps of one to 200 degrees celsius and the instrument consumes 550 Watts of power.

(P.T.I. Science Service 11(16), 1992, 3-4)

339

Columns for foods and beverages analysis

Phenomenex has greatly expanded its range of HPLC columns for analysis of foods and beverages. REZEX columns are now available for analysis of carbohydrates, organic acids, alcohols and sugar alcohols in complex matrices such as drinks, juices, corn syrups, fermentation broths, and many others. Major advances have been made with regard to column efficiency, column reproducibility, and column lifetime. Based on a rigid, sulfonated styrenedivinyl-benzene matrix, REZEX columns offer outstanding separations via ion-exchange, ion-exclusion, partition, and sizing mechanisms. Five different ionic forms are now available, including calcium, hydrogen, silver, lead, and sodium, as a series of ten columns each with a unique selectivity. Selected applications, including separation of DMSO and ethanol, separation of oligosaccharides, separation of saccharides, separation of sugar alcohols, analysis of honey, separation of alcohols, and separation of amino sugars, are supplied in a brochure accompanying the columns. Columns are available in ten standard configurations as well as custom configurations. Guard columns are also available. For further information write to: Mayura Enterprises, 455, 18th Main, IV T Block, Jayanagar, Bangalore, Karnataka 560 041.

(Industrial Products Finder, 20(9), 1992, 120)

340 Precision density meter

This is another, but unique, addition to the range of concentration/density measuring instruments by the manufacturers of the first digital density meter of the world. The DMA 38 is designed to suit the need in areas where the maximum precision required is not more than 0.001 g/cm^3 . A built-in solid state thermostat capable of heating as well as actively cooling maintains sample temperature constant at the preselected temperature which may be above or below ambient - a feature so far available only with instruments having a higher accuracy than 0.001 g/cm^3 from Anton Paar. Application areas include production and quality control of food and beverage, cooking oils, and milk. For more details write to: Elder Pharmaceuticals Ltd., Instruments Division, 101 PSB Apartments No.4, B G Kher Road, Worli, Bombay 400 018. (*Chemical Products Finder 11(1), 1992, cover page*)

COMMERCIAL INTELLIGENCE

Production (Raw materials)

341 Area and production of coconut 1988-89 (Final estimate)

State	Area (Hectares)	Production (Thousand nuts)
Andhra Pradesh	52,000	511,215
Assam	9,339	65,884
Karnataka	219,482	1,129,409
Kerala	866,467	3,841,000
Maharashtra	7,800	103,041
Orissa	30,536	179,600
Tamil Nadu	214,234	1,917,800
Tripura	7,026	4,216
West Bengal	19,807	238,472
Andaman & Nicobar Islands	23,258	81,368
Lakshadweep	2,755	25,200
Pondicherry	1,718	23,181

(*Agricultural Situation in India February 1992, 886-887*)

342 **Onion output, exports up**

Onion production, during 1991-92 was 32 lakh tonnes (provisional) as against 31.49 lakh tonnes in 1990-91 and 30.65 lakh tonnes in 1989-90.

Onion exports rose from 68983 tonnes valued at Rs.5.34 crores in the year 1974-75 to 406135 tonnes valued Rs.162.78 crores in 1991-92.

(Financial Express 24 October 1992, 3)

Production (Industrial)

343 **Tea production**

India's tea production is expected to touch an all time high of 740 million kgs in 1991, 23 million kgs more than last year's production, reports PTI.

According to official statistics, South India's share in this is 187 million kgs, an increase of 14 million kgs over the previous year's production.

However, the average price per kg of tea dropped from Rs. 35.11 in 1990 to Rs.30.15 this year in the case of CTC tea and for orthodox variety the price came down to Rs.36.14 from Rs. 38.97.

On the export front, South India exported 51 million kgs of tea this year and earned Rs. 227 crores, Rs. 3 crores more than last year. Soviet Union, which bought 40 million kgs from South India, continues to be the single largest buyer of South Indian tea, the second largest buyer being Egypt.

(Food Talk 4(7), 1992, 20)

344 **Production of milk powder banned in Delhi**

The Government has prohibited manufacture of whole milk powder, skimmed milk powder, and certain other milk products in the capital till December 31, this year.

An order under the Delhi (milk and milk products) control order has been promulgated on October 3 for the purpose.

(Deccan Herald 11 October 1992, 13)

345 **Sugar production**

According to the Indian Sugar Mills Association, the sugar production during the month of July, 1992 was about 0.95 lakh tonnes as against 0.50 lakh tonnes during the month of last year. This brings the total output during the season 1991-92 to 133.18 lakh tonnes as against 119.13 lakh tonnes during

the corresponding period last year. The closing stock of sugar as on 31.7.92 was 69.14 lakh tonnes as against 52.17 lakh tonnes comprising of 51.97 lakh tonnes indigenous sugar and 0.20 lakh tonnes imported sugar.

(Indian Sugar Mills Association Press Release 8th September 1992)

EXPORT

346 Buffalo meat waiting to be exported

India exports mutton, buffalo meat, canned meat, poultry products and animal casings. Buffalo meat has come to stay as the major export earner. For instance, of the total export of 59,500 tonnes of meat and meat products in 1987-88, valued at Rs. 93.9 crores, 70 per cent comprised buffalo meat, followed by mutton (23 per cent), animal casings (5 per cent) and canned meat (one per cent).

A review of the trend of meat production and export in India reveals the vast potential of buffalo meat, which is consumed very little within the country. Buffalo meat can very well be developed as an export-oriented commodity, provided Indian authorities take the necessary steps. The low slaughter rate of the buffalo population, and other such technical advantages, have contributed significantly to the export potential of meat. During the period 1972-82, the buffalo population increased annually by about 14 per cent on an average. The religious taboo against cow slaughter does not apply in the case of buffloes. A significant characteristic of buffalo meat is that its fat content is low, and muscle fibre content high.

According to the All India Meat and Livestock Exporters Association (AIMLEA), buffalo meat production could be increased seven fold even with no greater slaughter than is warranted by the existing practice of doing away unproductive and uneconomic animals. The estimate is based on assumption that 35 per cent of the bovine population in India consists of buffaloes, of which 20 per cent are neither useful for breeding nor for drought purposes. According to an expert estimate, the scope of this resource could be appreciated by the fact that there are eight million male, adult buffaloes in India. With dressing percentage conservatively estimated at 50-55 per cent, the additional meat that could be produced from some 20 million male buffaloes, which could be salvaged and reared for meat purpose, would amount to over one million tonnes, more than double the present level of meat production. According to a study by the Operations Research Group (ORG), by 2001 AD, about 2.557 million buffaloes would be available for slaughter in India.

Assuming an average carcass weight of 100 kg per bovine as per FAO standards, the total potential of buffalo meat would come to 2.56 million tonnes as against the existing estimated production of 355,000 tonnes.

Primarily because meat from India is cheaper, and has low fat content, Indian exporters have been able to comply with the strict stipulations of the Arab importers for product packaging, levelling and prompt delivery of small odd lot consignments. Major exporting countries like Australia, New Zealand and the European community, were unable to compete and effectively market their product in the gulf states.

Exports of meat and meat products have increased substantially over the past decade, from Rs.14.7 crores in 1976-77 to Rs. 94 crores in 1987-88. In 1989-90, they rose further to an estimated Rs.117 crores. The main export item is buffalo meat, which has increased from Rs. 14.6 crores in 1987-88 to Rs.67 crores in 1987-88.

If India really desires to capitalise on the great potential of buffalo stock in this country, much has to be done in the fields of production, processing and marketing. Production capacities have to be expanded and modernised, existing slaughter houses need to be updated and modern abattoirs set up. There is every need to dispel the propaganda being carried out in the gulf countries by competitors that Indian animals are disease infected. With technical upgradation of processing technology and government support, the export potential of buffalo meat could be largely realised.

(Food Talk 4(9), 1992, 1-2)

347 Steps to boost marine products exports

The Government will set up a centre for excellence in aquaculture to give a major thrust to marine products exports.

This was indicated by the Minister of State for Commerce and Industry, Prof P.J. Kurien, during a meeting with representatives of industrial houses entering the field of shrimp aquaculture to consider the possibility of setting up a centre for the development of export-oriented aquaculture in the country.

The Minister said while the Government could meet the initial capital requirements for setting up the centre, which is projected to cost Rs. 100 crores, it could thereafter be run on commercial lines with full autonomy for scientists, experts and others engaged in the activities.

The Ministry of Commerce has identified aquaculture as a major thrust area where there is a possibility of achieving quantum jump in exports. While

welcoming the idea, the industry representatives emphasised that such a centre should primarily act as a nodal point of transfer of technology on a commercial basis and the activities of such a centre should be self-funding.

He suggested that aquaculture activities should be expanded to cover items other than prawn also to fully tap the potential in the marine products sector.

Exports of marine products during 1991-92 amounted to Rs.1,439 crores or \$ 584 million, showing an increase of about 50 per cent in rupee terms and 9.1 per cent in dollar terms. The target for the current financial year has been set at \$ 640 million.

(Financial Express 12 October 1992, 4)

348 Tiger prawns export

The Marine Products Export Development Authority (MPEDA) earned foreign exchange worth Rs.1,400 crores by exporting 170,000 tonnes of tiger prawns during the last financial year.

This was disclosed to UNI by an MPEDA spokesman at Chinagollapalem island village about 40 km from here.

MPEDA was trying to organise village level camps to educate farmers about a disease prevalent among prawns in Guntur, Krishna, East and West Godavari districts.

(Financial Express 28 July 1992, 14)

349 Spices Board launching 'logo' scheme

The 'logo' scheme of the Spices Board aimed at promoting Indian brand names abroad will be launched by this month-end.

The board has drawn up a set of parameters, including quality norms, for granting the logo to the exporters, according to Mr. T. Nandakumar, Chairman Spices Board.

The board has also arranged for interest-free loans to support the exporters' brand promotion drive abroad, he said while inaugurating a four-day seminar on Spices Processing and Export organised by the Federation of Associations of Small Industries of India (FASII).

He called upon the exporters to launch similar common brand promotion programmes at various levels which alone will push up India's export of spices, especially value-added products, ensuring higher foreign exchange returns.

Quoting statistics, Mr. Nandakumar said of the 4.5 lakh tonnes of spices traded worldwide, India accounted for one lakh tonnes, representing 22 per cent. But in value terms, India's share was only 10 per cent of the total world business of \$ 1.5 billion.

This is partly because the country does not produce high-value spices like saffron and vanilla. This means there is excellent scope for taking up cultivation of these spices in a big way here.

There is also need for going in for more and more value-added products like spice oils, oleoresins, spice and curry powders. Explaining the potential for higher foreign exchange returns from these items, he said spice oil and oleoresins, which fetched Rs.14 crores from export a couple of years ago, logged Rs. 56 crores last year and were poised to touch the Rs.75-crore mark in the current year.

(Financial Express 2 September 1992, 14)

350 Cess on pepper goes

The Union Commerce Ministry has decided to withdraw, with immediate effect, the two per cent export cess on pepper for the remaining period of the current financial year.

This was announced here on Monday by the Union Minister of State for Commerce and Industry, Prof. P.J. Kurien while addressing a high-level meeting got up by the Kerala Government to discuss the problems of pepper growers.

Prof. Kurien said a notification to this effect would be issued within three days by the Ministry.

He said the decision to do away with the cess entailed a loss of about Rs.6 crores to the Centre.

The Minister also announced extension of an additional technical credit to the tune of \$ 5 million to Russia exclusively for the purchase of pepper from India. A \$ 25-million worth technical credit had already been extended to Russia for the purchase of pepper, tea, tobacco and coffee.

He said pepper export had suffered a jolt after the collapse of the Soviet Union, the major buyer of Indian spices, and stiff competition from other pepper growing countries. Some countries were offering a lower price for pepper than India. Against this backdrop, efforts were being made to find out new markets for the pepper produced here.

(Financial Express 20 October 1992, 1)

351 Soybean meal export

Exports of soybean meal during 1991-92 fetched about Rs.668 crores, showing an impressive increase of nearly 41 per cent over the previous year's figure of about Rs.474 crores.

Informing this to newsmen here on Friday, the Soybean Processors Association of India (SOPA) Chairman, Mr. O.P. Goel, said higher export earnings in the face of only marginal increase in exports in the quantum of 13.59 lakh tonnes as against 13.53 lakh tonnes in 1990-91 reflect the impact of devaluation and higher unit value realisation because of the very favourable international environment.

While the combined exports of various extractions valued at Rs.916.88 crores constituted 91.5 of the total exports of the oilseeds sector, the share of soyabean meal in exports of all the extractions put together, stood as high as 72.8 per cent.

(Financial Express 21 September 1992, 8)

352 Processed food export

Indian agricultural and processed food exports including cereals, received a quantum jump last year, following the liberalisation, touching Rs. 1800 crore during 1991-92.

Disclosing this at a ceremony to present export awards, organised by the Agricultural and Processed Food Products Development Authority (APEDA) here today, the Minister of State for Commerce, Prof. P.J. Kurien, complimented the exporters for their splendid performance.

He said even in dollar terms, the growth was nearly 23.5 per cent, which was 'very commendable' especially in the backdrop of recessionary trends that characterised global economy.

Stating that the government attached the highest priority to pushing up exports of agricultural and processed foods, the Minister disclosed the major changes made in trade policy.

Prof. Kurien said in the 1992-97 exim policy, the definition of 'manufacture' has been widened to include agriculture, aquaculture, animal husbandry, floriculture, horticulture, pisciculture, poultry and sericulture.

He said as a result of the changes, exporters involved in these activities would qualify for the Export Promotion Capital Goods (EPCG) scheme and the Advance Licensing Scheme which was till now available only to engineering and other manufacturing sectors.

Prof. Kurien announced that the government has decided to initiate a major programme for boosting horticultural exports by building up infrastructural facilities.

He said a set of consolidated proposals put forth by the APEDA to strengthen the infrastructure both at the farm level as well as at exit points like airports and seaports, had been considered and approved by an inter-ministerial group headed by the Agriculture Minister.

He said the expenditure envisaged on this scheme, which was on the principle approved, would be Rs.662.5 crore out of which nearly Rs.239.5 crore would be contributed by the government and the balance mobilised from private sources and commercial banks.

(Deccan Herald 22 October 1992, 13)

353 Increase in exports from food processing sector likely

The Government expects a 50 per cent increase in exports and a substantial flow of foreign investment in the food processing and marine products sectors during the year 1992-93.

The government has already approved investment proposals aggregating to Rs. 2,500 crore in various joint ventures and export-oriented units (EoUs). These include 50 proposals involving foreign investment. The total foreign equity investment (alcohol units) is over Rs.300 crore, accounting for 25 per cent of the total foreign equity approved in all sectors taken together.

In addition, several export-oriented units (EoUs) in these sectors have been approved. These include 23 EoUs for fruits and vegetable products, two for meat and poultry products, two for beer, four in consumer products and 30 EoUs in deep sea fishing and fish processing sector have been approved.

Export of marine products, which jumped from Rs.857 crore in 1990-91 to Rs. 1,365 crore in 1991-92, is likely to exceed Rs. 2,000 crore in the current financial year, according to the estimates of the food processing ministry.

The ministry is optimistic about the performance of food processing industries especially since this sector, hitherto considered as luxury industry, was accorded a "priority industry" status under the new industrial policy.

After the new industrial policy was announced, the food processing ministry obtained other concessions such as substantial reduction in import duty on capital goods required for processed food units and liberalised procedures for importing technology and engaging foreign technicians.

(The Economic Times 23 July 1992, 1,14)

354 Panel suggests tax rebates for food processing industry

The Central government sponsored working committee on export of processed foods has recommended tax concessions and better credit facilities for the food processing industry.

The committee, set up by the ministry of commerce, said these steps, as well as establishing of an active link between the farm and the processing units were necessary to enlarge and build a strong domestic base for the industry, a pre-requisite for boosting the export of processed foods.

A report recently submitted to the ministry said the domestic product base had so far been hampered by the uneconomical running of the industry with poor quality raw material procured at high cost. Besides this, high idle capacity and top heavy taxes also raised final prices of the production almost three times the initial ex-factory cost.

The committee, chaired by Mr. R.L. Chopra, was constituted a few months ago for identifying select items as 'extreme focus' segments to achieve atleast 30 per cent export growth annually in value and volume terms over the next three years.

The committee also underlined that India's share of export of processed foods in the world market had come down from about 1.2 per cent in 1978 to 0.44 per cent in 1988.

The committee recommended the creation of necessary infrastructure by the central and state governments including that of paying special attention towards growing of fruits and vegetables, not only to fill the gap for domestic consumption but also for export of processed food.

For this, the committee stressed the need for devising a national horticulture policy to undertake a comprehensive plan for study of agro-climatic conditions and financial support for boosting fruit cultivation, the report said.

Indicating that yields of commercial crops in India were almost one third that of the developed countries, the report recommended providing facilities and support for undertaking cultivation of fruits and vegetables on large tracts of land under the supervision of processors and exporters.

In this context, the report supported the change in the land laws, which were under the purview of the state governments, to allow the processing units to go in for captive cultivation.

It also recommended that agriculture universities and institutes expand the tissue culture technology for commercial exploitation.

The report said financial institutions, particularly Nabard should finance the field operations especially the shift to tissue cultured plants. The rate of interest at least for the export units should not exceed nine per cent, the report said.

Besides this, all cess, fees and octroi should be abolished for processed foods to make them less expensive in domestic and export markets, the report said.

It also recommended a cut in transportation costs to encourage transport companies to change over to refrigerated vans with a 20 per cent subsidy.

Besides this, the shipping rate should be only 60 per cent of the present ones for items bound for European destinations, the report added.

The committee recommended only two per cent instead of the present rate of around 12 per cent of the fob value for promotional expenses on the products of exporters of processed foods.

In addition to this the export strategy must be implemented with a huge publicity back-up, the report said.

The committee also recommended the setting up of a national food processing authority to facilitate supply of credit from farming to processing and shipping and to undertake massive advertisement.

The authority having business and government representation should be run by the contributions from industry and the government, the report said.

The committee recommended that sufficient funds should be made available to the Agricultural and Processed Food Products Development Authority (APEDA) for undertaking collection of relevant data, general publicity abroad

and initiating buyers and sellers meets and organising of international fairs and exhibitions of products.

The report laid special emphasis on developing the packaging material industry within the country. At present packaging material was being imported against the advance licence on the official rate of exchange. Till this industry was developed within the country, the exporters must be allowed to import the material for at least five years, the report said.

The committee recommended that units which export at least 45 per cent of production directly or indirectly should be given rebate of 25 per cent on power tariff rates.

(The Economic Times 29 September 1992, 2)

355 Fruit exports may get subsidy

The Commerce Ministry is evolving a package to give a boost to the exports of agricultural and processed food, particularly fresh fruits and floriculture.

A recent review meeting held in the Ministry felt that there was a genuine case of subsidising air freight to increase the competitiveness of floricultural products.

The meeting, chaired by the Deputy Minister for Commerce, Mr. Salman Khurshid, was of the view that air freight rates from India were quite high compared to other countries and since the Government was giving a thrust to the exports of floricultural products, the demand for subsidising air freight merited consideration.

The Ministry has asked the Agricultural and Processed Food Products Export Development Authority (APEDA) to prepare a viable scheme in this regard. A Commerce Ministry-appointed committee had recommended air freight subsidy at 50 per cent to be granted for five years to establish an export base.

The meeting also decided to persuade the Ministry of Finance to reduce interest on export credit for floriculture exports.

The meeting was informed that the matter of import duty of 15 per cent imposed by EEC on Indian flowers has been taken up by the Indian mission. However, no results have so far been achieved.

It was suggested that the State Governments should be advised to identify the "fruit belts" where adequate infrastructure might be provided on a priority basis.

With regard to quality standards, it was noted that "agmark" has developed some standards for grading fruits and these could be updated to bring it on par with international standards. Packaging of good quality for fruits and vegetables was also underlined.

The meeting also decided to ask APEDA to prepare a scheme for the collection and dissemination of market intelligence on a regular basis and large storage facilities should be created in major fruit growing belts.

With regard to priority for the movement of fruit containers, it was felt that since fruits were a perishable product, the movement of fruit containers should be facilitated unhindered.

For this the normal stop over at the check posts could be avoided and a special placard might be allowed to be displayed on such containers for priority clearances at check posts.

The meeting decided to persuade the Finance Ministry to take a decision on the recommendation by APEDA for import of machinery and equipment for pre-cooling, refrigeration and post-harvest handling.

The main problem with regard to exports of processed and fresh fruits and vegetables are the lack of air cargo space, high air freight rates and the lack of vapour heat treatment plants, which would ensure entry of mangoes into the Japanese markets.

There is need to diversify fresh product exports which are mainly dependent on mangoes and onions.

During 1991-92, the export of APEDA items have been estimated at Rs. 925.01 crores against Rs. 512.50 crores during 1990-91.

(Financial Express 29 September 1992, 5)

356 Indian mangoes going places

This year, Indian mangoes have for the first time been exported to London and Paris by through refrigerated containers. The initiative for this effort was taken by the Agricultural and Processed Food Products Export Development Authority (APEDA), who invited international mango experts and a refrigerated expert to study the problem and suggest a solution.

The Inter-continental Container Transportation Co-ordination, Antwerp, was also commissioned by APEDA for this purpose, while two experts from Belgium and Kenya visited western India and supervised the post-harvest treatment and shipping operations.

So far, technology was available only for refrigeration of temperate fruits like apples and grapes. Tropical fruits like mangoes were not being exported through refrigerated containers as they are susceptible to chilling injuries.

With the new technology being developed successfully, India can now export fresh mangoes to Europe and its market share in EEC, which presently is a low 2.6 per cent, is bound to show quantum jump in future. India would also be able to compete with the exports from Pakistan, Kenya, the Philippines and Latin American countries.

India is the major producer of mangoes in the world having more than 60 per cent of share in production. However, it has not been a major exporter so far and comparatively small producers like Brazil, Mexico, Venezuela and Kenya have a much bigger share of the world market.

Traditionally, India has been exporting fresh mangoes mainly to West Asian countries and processed mangoes in the form of pulps and juices to East European countries.

(Financial Express 20 July 1992, 10)

357

Cold room at airports for perishable items

The International Airports Authority of India (IAAI) is planning to set up exclusive cold room facilities for the export of perishable items such as fruits and vegetables, flowers and meat at Bombay, Delhi and Trivandrum airports, official sources said here today.

They said the facility, being set up in collaboration with the Ministry of Food Processing, the Agricultural and Processed Food Products Export Development Authority, the National Horticulture Board and trade bodies, would help in increasing India's exports of perishable horticultural products.

As a first step, they said, a walk-in cooler, which can maintain temperature at -2 C and relative humidity of 85 to 90 per cent has been provided at IAAI's cargo terminal at the Indira Gandhi International Airport here.

The National Horticulture Board has extended assistance for providing similar facilities at IAAI's cargo terminal at the Bombay airport.

(Financial Express 22 July 1992, 1)

358

Nepal may ban Indian chocolates

Indian chocolates, immensely popular here, may be banned in the Himalayan Kingdom.

The State-owned English daily, "The Rising Nepal" in an editorial said what it called, "alarming disclosures" in the Indian press that several popular brands of Indian chocolates were harmful to health, as these brands contained four to 10 times the maximum allowable concentration of nickel.

It said the US Food and Drug Administration, which studied the Lucknow laboratory report, was "in apparent agreement" with the discovery.

For Nepal, the editorial said, the effects of the disclosure were telling. The overwhelming bulk of chocolate imports into Nepal originated in India. The brands that had been named as being harmful were popular among the Nepalese consumers also.

(Financial Express 16 September 1992, 2)

IMPORT

359 India to import palm oil from Malaysia

India has agreed to import three lakh tonnes of palm oil annually from Malaysia for the next two years. A memorandum of understandings for this purpose has been signed between the two countries.

The minister was of the view that the long term contract would enable India to import oil at competitive price, instead of the present system of buying through tender system. He said that India produces 90 per cent of its edible oil requirement and for balance it has to depend on imports.

(The Economic Times 18 August 1992, 1)

TRADE INFORMATION

360 Huller units to be modernised

About 5000 huller units in rice milling sector would be modernised during the Eighth Plan.

According to a press release such huller units in rural areas would be provided with assistance of Rs.10,000 per unit in the shape of grant in aid.

Evaluation studies have shown that hullers while milling the rice causes a great damage with large percentage of broken and powdered rice. These generally yields very inferior quality of bran mixed with husk impurities. With modernisation it would be possible to improve the quality of by product and to reduce the losses to a large extent.

(Financial Express 10 September 1992, 4)

361 Status of the Industry

As on 1st January, 1992 the country had 86315 hullers, 4098 shellers, 8300 hullers cum shellers, 32969 rice mills, 583 roller flour mills, 284 fish processing units, 3822 fruit and vegetable processing units, 577 sweetened aerated water units, 130 ice making units and 313 cold storages.

(CIFTI Update May 1992, 4)

362 Conditioned beer

The Centre has added more conditions to the regulations governing creation of additional capacities for beer meant for domestic sale. At least 20 per cent of the total project cost will now have to be met by non-resident Indians or foreign equity in hard currency. Since June 1991, 44 letters of intent for the manufacture of beer have been issued. Roughly 830 applications are also pending.

(Business India 20 July - 2 August 1992, 24)

363 New wine launched

Indage (India) Ltd., manufacturers of sparkling wine, has launched a new brand "Riviera red wine", a principle blend of Pinot Noir grapes.

Addressing pressmen on the occasion Mr. Sanjay Khanna, Managing Partner, said the company hopes to sell about 50,000 bottles and is targeting one lakh bottles by the end of the year. The company is concentrating on the wine market since it is increasingly being considered as a health tonic and the global trend of changing over to wine consumption, he said.

(Deccan Herald 5 August 1992, 13)

364 51% foreign equity in food industry allowed

Setting up of new plants and machinery required in the agri-business and the food processing industries with 51 per cent foreign equity and technology transfer tie-ups, will get automatic clearance under the new list announced by the government recently.

The code specified in the list that follows for the item description is as given in the Indian Trade Classification (ITC) list.

The list of items selected for automatic clearance is as follows:

89.02 Fishing vessels: factory ships and other vessels for processing or preserving fishery products (up to 10,000 OWT).

84.19 Machinery, plant or laboratory equipment, whether or not electrically heated, for the treatment of materials by a process involving a change of temperature such as heating, cooking, roasting, distilling, rectifying, sterilizing, pasturising, steaming, drying, evaporating, vaporising, condensing or cooling, other than machinery or plant of a kind used for domestic purposes: instantaneous or storage water heaters, non-electric.

84.22 Dish washing machines (other than those of the household type); machinery for cleaning or drying bottles or other containers; machinery for filling, closing, sealing, capsuling or labelling bottles, cans, boxes, bags or other containers; other packing or wrapping machinery; machinery for aerating beverages.

84.23 Weighing machinery (excluding balances of a sensitivity of 5 cg or better), including weight operated counting or checking machines; weighing machines weights of all kinds.

84.34 Milking machines and dairy machinery.

84.35 Presses, crushers and similar machinery used in the manufacture of wine, cider, fruit juices, or similar beverages.

84.38 Machinery not specified or included elsewhere, for the industrial preparation or manufacture of food or drink, other than machinery for the extraction or preparation of animal or fixed vegetable fats or oils.

84.39 Machinery, for making pulp of fibrous cellulosic material or for making or finishing paper or paperboard.

In a notification, the government has said the authentic description will be treated as specified in the item description. Where the description relates to a group of articles, all the sub-classifications superceding it shall be taken as inclusive, unless specifically mentioned otherwise.

(Indian Food Packer 46(1), 1992, 65-66)

365

Measures to strengthen food processing sector soon

A host of measures to strengthen the food processing industry are in the offing. On the agenda are the establishment of food processing training centres in rural areas, a national cold storage grid aimed at creating proper linkages between industry and the processing sector, a national livestock production development council and a marine fisheries development board.

Announcing these measures here on Saturday, the Union Minister of State for food processing industries, Mr. Gomango, suggested that state governments should strengthen the data-base and information network in regard to agriculture and horticulture also. This, he said, would help in planned growth of the food processing industry.

(The Economic Times 23 August 1992, 16)

366

Processed foods R and D

The Centre has attached top priority to research and development to promote traditional Indian food products and has asked the States to make a detailed survey about the availability of raw material for processed foods in their areas.

The Union Minister of State for Food Processing Industries, Mr. Giridhar Gomango, told this to the members of the Consultative Committee attached to his ministry that the ministry had made a provision of Rs.3 crores for the research and development scheme during the 8th plan.

(Financial Express 29 July 1992, 1)

367

Funding for R and D

India's annual expenditure on research and development (R and D) in science and technology has decreased substantially last year. According to the Department of Science and Technology, the national R and D investment in 1990-91 was Rs.4,186.43 crores which was 0.89 per cent of the gross national product (GNP). In 1988-89, the R and D was 0.96 per cent the GNP at approximately Rs.4,003 crores.

In the mid-1980s, the R and D investment was a healthy 1.1 per cent and India was proud of this figure, the highest among developing countries. On the other hand, most of the developed countries devoted two to three per cent of their GNP and R and D. India's per capita R and D expenditure was just \$ 2.76 compared to \$ 100 to 600 for most of the developed countries.

Only 0.27 set per thousand were employed in actual R and D. Some of the other highlights of R and D investment in 1990-91 are: In the institutional sector, about 14 per cent of the total expenditure was on basic research, 39% applied research, 35% on experimental development and rest 12% other supporting activities.

(Chemical Weekly 37(50), 1992, 111)

368 Patent information system to be computerised

The Industry Ministry is undertaking a three-year modernisation project of the Patent Information System in Nagpur with a foreign exchange and a rupee component of \$ 6,91,700 and Rs. 1.3 crore respectively. The three-year project will aim at computerising the manually kept patent information in the Nagpur office.

The project will be executed by the World Intellectual Property Organisation and the United Nations Development Programme will finance the foreign exchange component of the project. Amongst the aims of creating a simplified information module is to see that Indian companies do not pay royalties for patents on products that have lapsed. Industry Ministry sources say Indian companies often pay royalty for patent rights in foreign collaborations which have lapsed. As there is likely to be a greater competition in the Indian market place due to increasing liberalisation, it is felt that companies would seek to innovate on their goods and services to sustain their demand levels.

Consequently, the service will provide technology alternatives that a company can seek from a prospective foreign collaborator to an offer of technology it receives. According to official sources in the Industry Ministry, the project is also required as the manual system in Nagpur is under-utilised due to the herculean effort involved in retrieval. For instance, it is estimated that there are close to 30 million patent documents and this number is increasing at the rate of one million each year. All industrialised countries have also established patent information units to facilitate their developmental efforts.

(Chemical Weekly 37(45), 1992, 108)

369 Food ethics

Britain's government has set up a committee to examine ethical issues relating to genetically modified foods. John Polkinghorne, the President of Queen's College, Cambridge, is chairing a study into the subject. It will investigate such issues as future trends in the production of transgenic organisms and the ethical concerns raised by the use of food products derived from them.

(New Scientist No. 1842, 1992, 11)

370 **Wastage of fruits and vegetables**

About 30 per cent of the country's annual production of fruits and vegetables worth Rs.3,000 crore is wasted due to inadequate post-harvest processing, according to a study by a research firm here.

Mr.C.K. Sharma, Managing Director and Mr. Mathew Paul, Director, Marketing and Business Associates, told reporters on Thursday while India's production of vegetables is estimated at 40 million tonnes and fruits at 28 million tonnes, less than 10 per cent of these are processed as compared to 70 per cent in some developed countries.

The reasons for this are traced to lack of right management techniques, technologies, market information, processing machinery, storage systems as well as poor quality seed strains and R and D information dissemination.

According to the study, though convenience foods have been found attractive, consumers were choosy about health, taste and price. About 30 per cent of the sales of branded products occurred in the four metros.

(Deccan Herald 10 October 1992, 13)

371 **Foreign tie-up to make milk products**

Milk products like lactose and milk casein were being imported so far are to be manufactured domestically in the near future. The Government has given approval for a proposal of foreign collaboration and investment in this regard.

This was disclosed by the Minister, of State for Food Processing, Mr. Giridhar Gomango, while addressing the Consultative Committee attached to his Ministry. He said the Government has already delicensed the manufacturing of milk products subject to locational condition. This has been done to diversify and develop the milk industry. Its further development would entirely depend on the availability of liquid milk. Underlining the need for increasing milk yield, the Minister said, though India is the third largest producer of milk in the world, there was still scope for increasing it.

(Financial Express 27 October 1992, 1)

372 **Mushroom cultivation**

An action plan for mushroom production in Rajasthan is now under consideration of the Union Horticulture authorities.

In the past, mushroom cultivation has been tried in the State but did not succeed in the absence of a proper marketing facility.

Under the plan, the Directorate of Horticulture proposes to arrange demonstrations and training in mushroom cultivation at district headquarter of Jaipur, Udaipur and Ajmer in collaboration with Department of Agriculture. Free kits would also be made available to prospective cultivators.

During November to February, Jaipur has ideal temperature for mushroom cultivation - between 16 and 24 degrees celsius.

Himachal Pradesh is known for mushroom cultivation, and also has canning facilities.

(Financial Express 29 September 1992, 5)

373 Coconut development projects

The Centre has sanctioned Rs. four crore for implementing various coconut development projects in Kerala during 1992-93, including a technology development centre for improving post-harvest processing and marketing of coconut, a coconut development board press release said.

(The Economic Times 22 August 1992, 3)

374 Action plan for food irradiation

The Interantional Atomic Energy Agency (IAEA) is preparing a draft action plan for commercial application of food irradiation technology in developing countries.

The agency's work is the result of an initiative by India to place food conservation in developing countries on the technical co-operation agenda of IAEA.

The document now under preparation will be placed before the annual meeting of the international consultative group on food irradiation, when it meets at Orlando, Florida in the last week of October. The group advises IAEA, WHO and FAO on matters related to food irradiation.

According to informed sources, there is a consensus that the action plan, as suggested by India to be implemented by the agency in cooperation with the WHO and the FAO.

The IAEA action plan on commercial food irradiation in developing countries is to contain model regulations on the codex general standard

principle, information on conditions required for the commercial food irradiation, definition of a suitable commercial irradiator, operational issues and expenses and consumer education.

(Financial Express 7 September 1992, 2)

375 Banana centre

The Indian Council of Agricultural Research (ICAR) has decided to set up a National Research Centre on Banana at Tiruchi.

The Centre will undertake research on major national issues concerning banana. It includes varietal improvement by evolving high yielding varieties, research in major banana diseases like bunchytop of banana through tissue culture techniques.

It will also evolve suitable post harvest technologies for promoting banana exports besides undertaking basic research.

A budget allocation of Rs.2.50 crores has been made for the centre during the Eighth Plan.

(Financial Express 11 September 1992, 5)

376 ICAR centre for women

The Indian Council of Agricultural Research (ICAR) has decided to set up a National Research Centre for Women in Agriculture at Bhubaneswar to evolve suitable technologies to reduce the drudgery of rural women. This was announced by the Union Minister of State for Agriculture, Mr. K.C. Lenka in New Delhi on Wednesday.

The centre will seek to identify, test and develop women specific technologies related to crop and livestock production, post-harvest technology and integrated pest management.

The centre is being set up in accordance with the recommendation of the Working Group on Agricultural Research and Education.

The group in its report said the farming systems research and on-farm research programmes should take into consideration the security of income and livelihood of farm women.

The research centre will undertake applied/adaptive research to increase women's participation and contribution to the over all agricultural growth. It will also evolve suitable methodologies for transfer of technology to farm women.

(Financial Express 11 September 1992, 5)

377 Environment Protection Institute to be set up

An Environment Protection Training and Research Institute (EPTRI) is being set up at Gachowli near Hyderabad to cater to the demands of industry for training as also for providing consultancy in pollution treatment problems besides being engaged in training and research in overall environmental issues. According to a note prepared by the institute, it is being set up with a Rs. six crore assistance from the Swedish International Development Agency. Besides receiving assistance from the Centre and being accorded "regional" status, the government of Andhra Pradesh has also agreed to lease 15 acres of land for construction of the building.

While the basic thrust of the institute would be research and training, it would serve the needs of industry, too. Environment awareness would be created amongst the general public and the institute would work towards upgrading the skills of personnel in pollution control boards, government organisations and those involved with the environment on a day-to-day basis. The institute would also conduct training courses for top level and middle level management in industry as also for shop floor operators. Seminars and research, too, would be conducted on a regular basis on general environmental matters with a view to dissemination of knowledge on environmental awareness and its importance. The courses would lay stress on the importance of process technology to check environment pollution as also on pollution abatement technology and pollution monitoring technology.

(Chemical Weekly 37(46), 1992, 60)

378 NDDB to assist TN in expansion of vegetable oil projects

The National Dairy Development Board (NDDB) would assist the Tamil Nadu government in the expansion of vegetable oil and oilseeds projects in Salem and Dharmapuri districts.

This was agreed upon at a meeting of the Tamil Nadu minister for agriculture, Mr. K.P. Krishnan and the NDDB Chairman, Dr. V. Kurien and Managing Director, Dr. Amrita Patel, at Anand on Thursday.

Dr. Kurien handed over a cheque of Rs. 153 lakh to Mr. Krishnan for the Tamil Nadu Co-operative Oilseeds Growers' Federation.

The NDDDB has also agreed to set up a 'Lok dhara' packaging station at Tancof's existing facility at Guindy to help market a more economically blended cooking medium. A Rs. 45 crore fruit and vegetable project would also be set up in Madras.

A memorandum of understanding (MoU) was signed between the government of Tamil Nadu, the National Tree Growers' Co-operative Federation and NDDDB for implementing the Tree Growers' Co-operative project in Tamil Nadu with an assistance of Rs. 5.3 crore from the Swedish government.

The project envisages to organise 100 village-level tree growers' co-operative societies and one regional union during the project period of five years. It would generate 2.3 lakh days' employment for the rural poor.

(The Economic Times 31 August 1992, 4)

FOOD REGULATION, QUALITY CONTROL AND HYGIENE

379

The Spices Board (quality marking) Regulations, 1992

G.S.R. 73(E). - In exercise of the powers conferred by section 39 of Spices Board Act, 1986 (10 of 1986), the Spices Board, with the previous approval of the Central Government, hereby makes the following regulations, namely:-

1. Short title and commencement - (1) These regulations may be called the Spices Board (Quality Marking) Regulations, 1992.

(2) They shall come into force on the date of their publication in the Official Gazette.

(3) The scheme is voluntary and shall be applicable only to those who opt for the scheme.

2. Definitions. - In these regulations, unless the context otherwise requires, -

(a) "Act" means the Spices Board Act, 1986 (10 of 1986);

- (b) "Board" means Spices Board constituted under sub-section (i) of section 3 of the Spices Board Act, 1986 (10 of 1986)
- (c) "Chairman" means the Chairman of the Spices Board;
- (d) "Authorised Officer" means any officer of the Board authorised in terms of section 34 of the Act;
- (e) "Exporter" means a person holding certificate for export of spices under section 11 of the Act;
- (f) "Logo" means registered quality mark of the Board;
- (g) "Packer" means an exporter authorised by the Board to affix logo on packs of spices for export;
- (h) "Unit" means an approved premises where the packer has been permitted by the Board to affix logo;
- (i) "Panel" means panel of experts consisting of officers from the Spices Board, Export Inspection Agency and Directorate of Marketing and Inspection authorised for assessment of the units;
- (j) "Packs" means consumer packs of 1 kg or less containing spices and spice mixes specifically mentioned in the certificate of approval and conforming to the standard specification as laid down in the Appendix annexed to these regulations;
- (k) "Sample" means packages of spices drawn for inspection as laid down in regulation 7.
- (l) "Specification" means grade specification as laid down in the Appendix annexed to these regulations;

3. Conditions to Affix Logo -- (i) A packer intending to use and affix logo shall apply to the Board in the prescribed proforma in Proforma-I in duplicate.

(2) The logo shall be used by the packer only for the units approved by the Board.

(3) For the purpose of approval, the packer shall satisfy the requirements laid down in these regulations.

(4) The certificate of approval shall be valid for a period of three years from the date of issue, subject to periodical review by the Board.

(5) On receipt of application as per sub-regulation (1), the Board shall arrange to assess the unit, and if approved, issue a Certificate of Approval.

(6) In the case of a unit not satisfying the requirements, non-approval shall be communicated to the packer by registered post.

(7) The approval of the unit may be suspended by the authorised officer for the following reasons, after giving notice of a period of seven days;

- (a) If the sanitary and hygienic conditions of the unit are not satisfactory;
- (b) If the approved technologist has left the services of the unit or he is on long leave and the post is kept vacant for more than two months;

- (c) If the essential testing facilities are not maintained satisfactorily;
 - (d) If two consecutive samples of the same spice or spice powder drawn by the authorised officer do not conform to the required specifications.
- (8) The approval of the unit shall be withdrawn for the following reasons after giving notice of period of fifteen days;
- (a) If the reasons for suspension as at sub-regulation (7) persist for more than six months;
 - (b) If the packer has violated or deliberately attempted to violate the provisions of any of the rules and regulations made under the Act.
- (9) The non-approval, suspension of approval and withdrawal of approval shall be intimated in writing to the packer by registered post.
- (10) In the case of non-approval and withdrawal of approval, the unit shall be re-assessed on an application made by the packer and on the order of the Chairman.
- (11) In the case of suspension, the unit shall resume affixation of logo only after rectifying defects and obtaining a written permission of the authorised officer.
- (12) On receipt of application for the packer for renewal, the Chairman may renew the Certificate of Approval for a period of three years at a time on the basis of the past three years' performance of the unit.
4. Application of Logo :- Logo shall be applied only to packs containing spices specifically mentioned in the Certificate of Approval and conforming to the standard specification as laid down in Appendix annexed to these regulations.
5. Procedure and requirements for quality marking:- (1) A packer should document all the test procedures and analytical reports with a view to ensure that the product packed in the unit for export shall conform to the required standards as prescribed in the Appendix to these regulations under the Grade Designations and Definitions for various spices.
- (2) For the purpose of quality control an inspection testing, the packer shall employ a qualified technologist with a minimum qualification of a graduate degree with Chemistry as a subject or a degree in Agriculture.
- (3) A packer shall have own testing facilities with minimum equipments and chemicals to carry out the testing for relevant quality parameters prescribed in the Appendix to these regulations for various spices.
- (4) A packer affixing logo should have control at different stages namely, acceptance of raw material, processing, packing, testing and storage. For this purpose premises handling such activities shall either be in direct possession of, duly leased or such activities carried out under specific contracts, Any change of such premises shall be duly intimated to the Board for amending the certificate of approval.
- (5) Where the packer does not have his own laboratory, testing facilities, he may use the services of an outside laboratory provided such laboratory is an approved one under the

quality inspection scheme of Export Inspection Agency/Directorate of Marketing and Inspection. The use of such laboratories will be restricted to a maximum period of three years by which time the packer should arrange to establish his own laboratory. The Chairman may extend this period for two more years in exceptional cases.

(6) Sanitation and Hygiene:- (i) All the premises, machinery equipment and utensils in the factory should be kept clean to avoid accumulation of dust, cobwebs, entry or rodents, birds and insects by providing wire mesh or net to the doors, windows and ventilators. The surroundings of the premises should be kept clean to avoid harborage of rodents and prevent entry of animals.

(ii) The personnel engaged in handling, processing and packing shall be free from communicable diseases. They should be provided with headgears and cover for mouth while working in the unit.

(iii) The unit should have atleast two toilets separate for gents and ladies provided with water taps, wash basin, sufficient quantity of water and detergent for cleaning hands and legs.

7. Control of Animals, Rodents, Birds and Pests. - (i) The packer shall ensure that animals, rodents and birds do not enter in the handling, processing, manufacturing, packing and storage premises.

(ii) The packer should set up and maintain effective control mechanism to prevent entry of insects and should have a laid down programme for periodic disinfestation and prophylactic spraying wherever necessary.

(8) Storage and housekeeping. - (i) The rejected goods should be kept separately in the store room with identification mark "Rejected" so that the same do not mix up with accepted goods.

(ii) The rejected and waste materials shall be periodically removed from the unit.

(iii) All packing materials and empty packs shall conform to the specifications prescribed for Brand Registration by the Board.

(iv) There shall be separate arrangements to store packing materials without affecting its quality by getting it contaminated with dust, insect infestation, harborage by rodents and exposure to extreme conditions of light and temperature.

(v) The products finally packed and passed for export shall be stored separately with the identification mark "For Export".

(9) Maintenance of Records. - (i) The unit shall lay down documentation system and maintain records for the purpose. This includes documentation of quality parameters of various spices at different stages.

(ii) The quality of consumer packs printed with logo shall be accounted for their use in export consignments and records should be made available to the authorised officer during his review/inspection.

(10) Calibration. - All equipments, instruments, gauges and scales used in the unit for weighment and measurement shall be periodically got calibrated and records maintained in proof of the calibration.

6. Procedure for Inspection. - (i) On receipt of an application as given in the Proforma-1 annexed with these regulations for authorising the use of logo the Board shall arrange to assess the facilities in the unit on the basis of the report submitted by a team of two officers of the Spices Board. The unit should possess facilities such as cleaning, grading, destoning and packaging to meet the quality requirements prescribed in the Appendix to these regulations for various spices.

(ii) Deficiencies, if any, shall be communicated by the Board within seven days after the inspection to the unit for rectification

(iii) Rectification carried out shall be verified by the officials of the Board prior to the assessment by the panel of experts within fifteen days on receipt of the intimation.

(iv) The unit having facilities as per these regulations on the basis of the report of the Board's officers shall be submitted to the panel of experts.

(v) The following shall be the composition of the panel of experts for adjudging adequacy of the facilities as reported by the team of the two officers of the Board, namely:-

- | | | |
|----|---|----------|
| 1. | Executive Director,
Spices Board. | Chairman |
| 2. | Director (Marketing),
Spices Board. | Member |
| 3. | Senior Scientist,
(Quality Control),
Spices Board. | Member |
| 4. | A representative of the
concerned Export
Inspection Agency. | Member |
| 5. | A representative of
Directorate of
Marketing and
Inspection. | Member. |

The quorum for the panel shall be three.

(vi) The panel, after due consideration of the assessment report may visit the unit, and shall make its recommendations as per Proforma-II.

(vii) The recommendations of the panel, shall be submitted to the Chairman for approval. Chairman's decision on the recommendations shall be communicated to the unit in writing.

(viii) Non-Approval. - In the case of non-approval, the unit may be reassessed as per these regulations.

(ix) Withdrawal of the Approval. - (a) The approval of the unit may be suspended by the authorised officer for the reasons given in sub-regulations (7) of regulation 3.

(b) The approval of the unit shall be withdrawn for the reasons given in sub-regulation (8) of regulation 3, after giving a notice of minimum period of fifteen days.

(c) In the case of suspension, the unit shall resume affixation of logo only in accordance with sub-regulation (11) of regulation 3. In the case of withdrawal, the unit shall resume affixation of logo only in accordance with sub-regulation (10) of regulation 3.

(x) Review of approved units. - (a) The operation of an approved unit may be reviewed once every year by the panel of experts. While, doing so the performance of the unit during the preceding one year shall be taken into consideration and recommendations made to continue or withdraw the approval.

(b) In all cases of suspension/withdrawal of approval of the logo, the Brand Registration approved by the Board shall automatically be suspended/cancelled.

(xi) Preparation of consignments for Export under Spices Board Logo. - (a) A packer shall prepare the consignment for export in consumer packs as per this regulation and the consignment so prepared shall conform to the grades and definition of quality prescribed in respect of these grades as set out in the specifications prescribed for each spice as given in Appendix to these regulations.

(b) Grade designations and definition of quality for other spices will be notified separately by the Spices Board.

(c) Spices shall be packed in packets/containers of one kilogram or less, approved and registered with the Spices Board.

(xii) Intimation Regarding Export. - A packer intending to pack spices for export under the logo shall give an intimation in advance to the Board in the Proforma-III annexed to these regulations.

(xiii) Place of Inspection. - (a) On receipt of an intimation, the Board may decide whether or not to sample the consignment for inspection.

(b) The Board may decide to inspect a consignment either on receipt of the intimation or otherwise and such inspection shall be carried out in the approved premises of the packer.

(c) It shall be responsibility of the packer to make arrangements for sampling and sealing and also to provide facilities for inspection.

(d) In addition to the inspection of the premises, the Board shall have the right to exercise such supervision of the consignments at any place of storage in transit or prior to actual shipment.

(xiv) Basis of Inspection. - Inspection of the spices meant for export shall be normally carried out with a view to see that the same conforms to the grade designations specified in Appendix annexed with these regulations.

7. Procedure for Sampling and Testing. - (1) When the Board decides to examine the consignments, representative samples shall be drawn from each lot. A lot in this context shall mean the total number of packages of the same variety and grade.

(2) For the purpose of drawing representative samples, the Board's officer shall select the packages as one per cent of the samples subject to a maximum of 5 packets per lot shall be taken for analysis. For the purpose of inspection one lot shall be a maximum of 10 metric tonnes for whole spices and 5 metric tonnes in the case of ground spices.

(3) The selection of packages for inspection shall be done at random and should cover as far as possible packages from various positions.

(4) If the lot after the analysis of the samples is found not conforming to the specifications of variety and grade declared in Proforma-III annexed to these regulations, and the same shall be intimated to the exporter.

(5) If two consecutive samples of the same spice or spice powder drawn by the authorised officer do not conform to the specifications for that spice or powder as per these regulations, the approval of the unit shall be suspended.

8. Testing of Samples in the Laboratory. - (1) The spice samples shall be analysed for all relevant characters specified for individual items as per these regulations.

(2) A report on the testing of each sample shall be made on completion of testing and observations recorded.

(3) A copy of the test report alongwith recommendations/suggestions of the authorised officer shall be intimated to the packer.

9. Appeal. - A Packer aggrieved by non-approval, suspension of approval or withdrawal of approval of a unit may appeal within thirty days of receipt of the communication to the Ministry of Commerce, Government of India. The decision on such an appeal shall be final.

10. Punishment. - Any exporter or packer using the logo without the necessary approval specified in these regulations shall be liable for punishment under section 30 of Spices Board Act, 1986 (10 of 1986).

[No. ME/SBL/01/90/774]

T. NANDAKUMAR, IAS,
Chairman, Spices Board.

PROFORMA I

From

To

The Director (Marketing),
Spices Board,
Cochin.

Sir,

Please carry out an inspection of our processing unit for the award of Spices Board Logo under the Spices Board (Quality Marking) Regulations, 1992. We furnish below the information regarding the facilities available in our unit for the processing of spices and spice products:

1. Name and address of processing unit :
2. Name and address of the owner :
3. Items of spices dealt with or exported (A separate statement showing details may be attached in support of the above.):
4. Whether manufacturer, exporter or merchant exporter (Annual production capacity):
5. Certificate of registration No. with Spices Board :
6. Brand Name(s)/Trade mark(s) registered with Spices Board, with Regn. No.:
7. Is the godown your own or hired :
8. Furnish the details of facilities available at factory (space, machinery, lighting, storage and sanitation):.
9. Is the premises approved by Directorate of Marketing and Inspection or Export Inspection Agency.;
10. Number of technologists with their names, qualifications and experience.:
11. Do you possess a quality control laboratory in your own premises?:
12. If not available mention the name of the laboratory where the quality testing of the products will be performed:

We hereby declare that we comply with the provisions of the Spices Export (Quality Marking) Regulations, 1992, and that the details furnished above are true to the best of our

knowledge and belief and nothing has been concealed therein. We also agree to allow the authorised officer to enter and inspect the processing units and laboratory approved for award of logo and sample the consignments for export at all reasonable times (8 a.m. to 5 p.m.) on all working days without any notice.

Yours faithfully,

Place:

Date:

Signature:

Name:

Designation:

(with seal)

PROFORMA II

SPICES BOARD MINISTRY OF COMMERCE (Government of India) COCHIN

Place:

Date:

REPORT OF THE PANEL OF EXPERTS

In exercise of the powers conferred under the Spices Board (Quality Marking) Regulations, 1992 the panel of experts consisting of the following members visited the processing unit of M/s..... (Name of the processor) located at.....(Name of the unit)..... in order to adjudge the adequacy of the facilities provided in the unit for processing spices for export.

1.

2.

3.

4.

5.

2. The panel met the following persons of the unit:

1.

2.

3.

3. The panel after perusal of the survey report and due assessment of the facilities in the unit decided to recommend/not to recommend due to deficiencies mentioned below, approval of M/s.....(Name of the unit) for processing spices for export under the Spices Board (Quality Marking) Regulations. 1992.

4. Deficiencies.

1.

2.

3.

4.

5.

The panel after due assessment, decided to permit Shri..... to supervise preprocessing and processing operations and to conduct organoleptic inspection and testing of spices.

5. The panel made the following recommendations for compliance of the processor:-

1.

2.

3.

4.

5.

6. Remarks, if any.

Names and signature of panel members.

PROFORMA III**INTIMATION REGARDING EXPORT**

From

To

The Senior Scientist (Quality Control),
Quality Evaluation and Upgradation
Laboratory, Spices Board,
COCHIN.

Sir,

The particulars of consignments packed under the Spices Board (Quality Marking) Regulations, 1992 for export are given below:-

1. Name and address of the exporter :

2. Name and address of the processor :

3. Description of the consignment :

(a) Name of the commodity :

(b) Brand Name :

(c) Quantity :

(d) Number of packages :

(e) Grade/variety etc. :

(f) Date of packing :

(g) Value :

(h) Shipping marks :

(i) Port of destination :

4. Exact address where the goods are stored for export. :

5. Technical requirements including specification as stipulated in the export contract:

6. Details of shipment :

(a) Probable date of loading :

(b) Name of the ship :

(c) Date of shipment :

(d) Port of shipment :

7. Details of the seal, if any :

8. Any other relevant information :

9. Reference and date of intimation sent to Export Inspection Agency/Directorate of Marketing and Inspection of the consignments, if applicable.:

It is hereby certified that the consignment mentioned above has been processed to satisfy the conditions relating to the Spices Board (Quality Marking) Regulations, 1992

It is certified that the consignment mentioned above has not been previously inspected.

Signature:

Designation:

Seal of the Exporter:

The Appendix Part contains Grade Designations and Definitions of quality of (1) Tellicherry and Malabar garbled black pepper (2) Black pepper ground (3) Cardamom, (4) Cardamom seed, (5) Cardamom ground, (6) Ginger, (7) Ginger ground, (8) Turmeric finger, (9) Turmeric ground, (10) Chillies, (11) Stalkless and clipped chillies, (12) Ground chillies,

(13) Coriander seeds (Dhania), (14) Coriander ground, (15) Fennel seeds, (16) Fennel ground, (17) Fenugreek seeds (Methi), (18) Fenugreek ground, (19) Cumin seeds (Whole), (20) Cumin ground and (21) Curry powder.

(The Gazette of India, Part II - Section 3 - Sub-section (i), No. 49, 1992, 19-32)

380

Prevention of Food Adulteration (Second Amendment) Rules, 1992

G.S.R. 101 (E). - Whereas a draft of certain rules further to amend the Prevention of Food Adulteration Rules, 1955, were published as required by Sub-Section (1) of Section 23 of the Prevention of Food Adulteration Act, 1954 (37 of 1954) with the notification of Government of India, in the Ministry of Health and Family Welfare (Department of Health) G.S.R. No. 256 (E) dated 3rd May, 1991 in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i), dated the 3rd May, 1991 at pages 1 to 6, inviting objections and suggestions from all persons likely to be affected thereby before the expiry of a period of sixty days from the date on which copies of the Gazette in which the said notification was published, were made available to the public.

And, whereas the said Gazette was made available to the public on the 10.6.1991.

And, whereas the objections and suggestions received from the public on the said draft rules have been considered by the Central Government.

Now, therefore, in exercise of the powers conferred by Sub-section (1) of Section 23 of the said Act, the Central Government after consultation with the Central Committee for Food Standards, hereby makes the following rules further to amend the Prevention of Food Adulteration Rules, 1955, namely:-

RULES

1. (1) These rules may be called the Prevention of Food Adulteration (Second Amendment) Rules, 1992.

(2) They shall come into force from the date of their publication in the Official Gazette, except rule 2 which shall come into force after six months of such publication.

2. In rule 42 of the Prevention of Food Adulteration Rules, 1955 (hereinafter referred to as the Principal rules), -

(a) for sub-rule (S), the following sub-rule shall be substituted namely:-

"(S) Every advertisement for and/or a package of food containing added Monosodium Glutamate shall carry the following declaration, namely:-

This package of(name of the food contains added MONOSODIUM GLUTAMATE UNFIT FOR INFANTS BELOW - 12 MONTHS"

(b) sub-rule (U) shall be omitted.

3. In rule 60 of the principal rules, after the words and figures "Sodium Stearyl-2-Lactylate and Calcium Stearyl-2-Lactylate" the following words shall be inserted, namely. -

"Polyglycerol Esters of fatty acids and polyglycerol Ester of interesterified Ricinoleic acid".

4. In rule 61 of the principal rules, after the words "Sorbitan esters of fatty acids or in combination", the following proviso shall be inserted, namely:-

"Provided further that Polyglycerol esters of fatty acids and Polyglycerol ester of interesterified Ricinoleic said may be used in bakery products and in chocolate to the extent of 0.2 per cent by weight".

5. In rule 64-B of the principal rules, after the words "Monosodium Glutamate may be added to an article of food", the following words and figures shall be inserted, namely:-

"under proper label declaration as provided in sub-rule (S) of rule 42".

6. In Appendix 'B' of the Principal rules, -

(1) In items A-16-01, A-16-02, A-16-03, A-16-05, A-16-06, A-16-07, A-16-09, A-16-12, after the words and figures, "prescribed in Rule 61-C", the following words and figures shall be inserted, namely:-

"It may also contain fumaric acid (food grade) certified by Bureau of Indian Standards to the extent of 0.3 per cent by weight".

(2) In item A-26-09, for the words, "The solution of Annatto colour in oil shall be clear and shall remain so on storage in suitable container at 15 C except for slight deposit of stearine", the following words and figures shall be substituted, namely:-

"The solutin of annatto colour in oil shall be either in the form of a clear solution and shall remain so on storage in suitable containers at 15 C except for a slight deposit of stearine or shall be in the form of suspension. The suspension on dilution with hot oil to being the Bixin content to 0.24 per cent shall be clear solution".

[No. p. 15014/11/90-PH (F&N)]

B.S. LAMBA, Jt. Secy.

381 New and revised Indian Food Standards

IS 9605:1992	Alpha-amylase, food grade (first revision). Gr 1.
IS 11924:1992	Cococa coatings (first revision). Gr 2.
IS 13334 (Part 2): 1992	Skim milk powder: Part 2 Extra grade Gr 3.
IS 13354: 1992	Ready Upma mix. Gr 2
<i>(Standards India 6(1), 1992, 35)</i>	

382 Avoiding cow's milk can prevent juvenile diabetes

Drinking cow's milk during infancy may trigger juvenile diabetes in people who are genetically prone to diabetes and avoiding it might provide a simple way to prevent this serious disease a study concludes.

The study published in Thursday's New England Journal of Medicine raises the possibility that when diabetes runs in families parents may be able to protect their children by eliminating dairy products during the formative first nine months or so after birth. However the case against milk is strongly circumstantial and not yet proven.

Experts caution that it is still too soon for anyone to recommend avoiding milk. But if later research upholds the theory it will provide the first strategy for stopping this disease. "If true, we should be able to do something to prevent diabetes altogether", said Dr. Hans-Michael Dosch, Senior author of the study at the hospital for sick children in Toronto.

Although milk is harmless for most youngsters the new study suggests that it may set off destruction of crucial insulin-making tissue in the one of every 500 people who gets juvenile diabetes by age 20.

(The Hindu 2 August 1992, 16)

383 Indian chocolates contaminated

The milk and chocolates produced by private companies are contaminated, according to speakers at a seminar on milk and milk products organised by the Mahila Dakshata Samiti (MDS) here yesterday.

They criticised the government for delicensing the dairy sector to attract private investment and forecast severe milk shortages as a consequence. A Lucknow-based scientist, Dr. M.C. Saxena, referred to the presence of dangerous levels of nickel in chocolates manufactured by leading companies and warned that it was a carcinogenic element.

Dr. Saxena, formerly associated with Council for Scientific and Industrial Research, also warned against contaminated hydrogenated vegetable oils and chocolates. In both cases, he said, the nickel level was much above the safety limit. Regretting that nickel has not been listed among the dangerous additives in the Indian Food Adulteration Act, Dr. Saxena said that it is a poisonous metal that caused cancer and other diseases.

According to Dr. Saxena, nickel is added in hazardous quantities to Indian chocolates to keep them from melting. Nickel serve as a hardening agent and a catalyst, he noted adding that foreign-manufactured chocolates melted much sooner in India than those manufactured locally by Indian or multi-national companies.

Reportedly, the World Health Organisation has already classified nickel as a carcinogenic and a reputed international laboratory had confirmed Dr. Saxena's findings regarding contaminated Indian chocolates.

According to the MDS, Dr. Saxena's findings were reported by the national media last year. The U.S. embassy is reported to have asked its staff to avoid eating Indian chocolates following the publication of Dr. Saxena's findings.

(The Times of India 30 August 1992, 7)

384 No high nickel content in chocolates

The Union Health Ministry today described as "unfounded" reports that popular brands of chocolates had excessive nickel content and said tests conducted in reputed laboratories reveal that the range of nickel content in them was similar to chocolates made in the US and Denmark.

An official release here said the analysis of popular brands of chocolates by these labs reported that the nickel content in them was in the range of "non-detectable to 1.76 parts per million". This range was similar to chocolates made in the US and Denmark.

The chocolates were subjected to tests in the Hyderabad-based National Institute of Nutrition and the Central Food Laboratory, Pune and Central Food

Lab, Calcutta, in the wake of press reports of excessive nickel content in popular brands of chocolates.

(Financial Express 18 September 1992, 1)

385 Panel to probe chocolate row

A three-member committee headed by the Director of the National Institute of Occupational Health, Dr. S.K. Kashyap, will look into the chocolate controversy. The decision was taken at a technical experts meeting, convened in New Delhi recently by the Health Ministry to discuss the alleged presence of excess nickel in chocolates and other food items.

The experts agreed that there was need for an independent review on the methodology adopted for estimating the nickel content in chocolates. And they also suggested that the entire issue of nickel toxicity be examined. It was recommended that the Indian Council of Medical Research (ICMR) may evaluate the scientific evidence of toxicity of nickel when consumed orally and may advise the government for setting standards for nickel content in food articles.

(Chemical Weekly 38(10), 1992, 66)

386 Nickel content in vanaspati

Nickel content of vanaspati (hydrogenated fat) collected from market and household was analysed by Scientists of Food Toxicology Laboratory, National Institute of Nutrition, Hyderabad. The mean nickel content of the 25 samples was 1.55 p.p.m. with a range from 0.3 to 4.54 p.p.m. Vanaspati sold in sealed container or as loose, as reported in the Journal of the Oil Technologists Association of India, did not show any difference in nickel content. Hence, vanaspati contributes negligible amount of nickel to the Indian diet.

(JOTAI, 23(3), 1991, 48-49)

TRANSFER OF TECHNOLOGY AND NEW INDUSTRIES

387 West Coast brewery project in Bombay

West Coast Breweries and Distilleries is setting up a Rs. 19 crore brewery and distillery project at New Bombay for manufacture of 50,000 hectolitres of beer per annum. It would also market 1500 tonnes of malt extract and 6000 tonnes of barley malt per annum.

The trial production is expected to commence during August '93, which would be followed by commercial production during September.

(Financial Express 18 August 1992, 13)

388 Food Processing Sector-49

The Government has approved 49 foreign collaborations including 20 by non-resident Indians (NRIs) in the food processing sector to give a boost to the country's food processing industry.

The total foreign equity investment in these approved units is over Rs. 300 crore which constitutes 25 per cent of the total foreign equity approved in all sectors taken together, official sources said here.

In addition to this, in many cases foreign technology agreement have been approved, the sources added.

The area in which foreign collaboration proposals have been approved include cereal based products (one), fruit and vegetable products (two), consumer industries (two), meat and poultry products (two), deep sea fishing (17) and fish processing (five).

The NRI proposals relating to the consumer industries sector include beer and alcohol.

About 40 units for the manufacture of beer and 26 units for non-molasses based alcohol have already been cleared by the food processing ministry, the sources said.

Besides this, 42 cases of rehabilitation in deep sea fishing, 23 cases of 100 per cent export-oriented units (EOUs) in fruits and vegetable products have been approved by the ministry.

For the first time two cases of 100 per cent export units in meat and poultry products have been approved while two cases of 100 per cent EOUs in beer against nil in the previous two years have been cleared by the ministry, the sources further added.

Other 100 per cent EOU units approved by the ministry include four in consumer products and thirty in deep sea fishing and fish processing.

The food ministry has also given a thrust to joint ventures leasing and test fishing and as many as 17 proposals in this sector have already been approved, the sources said.

For the first time fishing vessels of Indian fishing companies are being chartered by foreign fishing companies. Three projects for acquisition of fishing vessels have also been cleared.

The total industrial investment in the units approved for joint venture and EOUs and deep sea fishing is about Rs. 2,500 crore, sources said.

The sources added that on the implementation of the projects approved, the export of processed food estimated at around Rs.1500 crore in 1991-92, is likely to increase.

(The Economic Times 24 August 1992, 1, 14)

389 Export-oriented fruit processing unit

A 100 per cent export-oriented fruit processing unit with the assistance of the Danish Chamber of Commerce and Ificon, Copenhagen, is being promoted by the Karnataka State Industrial Investment and Development Corporation Limited (KSIIDC).

Pallavi Food Products and Beverages (Pvt.), the partner in implementing the unit will process banana, mango, guava and passion fruit. To be located in Bangalore or Kolar district, the project cost is put at Rs.12.93 crores.

According to a KSIIDC press note, efforts are on to rope in the Horticultural Producers Co-operative Marketing and Processing Society Limited (HOP-COMS) also as a promoter.

(Food Talk 4 (11), 1992, 14)

390 Idlies go hi-tech

Fast food is going truly hi-tech in the south. In a couple of months, *idlies* and *vadas* will be churned out from a fully automated computerised kitchen. Kovai Annapoorna Foods and Beverages Ltd., a public limited company promoted by Shree Annapoorna Gowri Shankar Group of Hotels, Coimbatore,

has set up a project at a cost of Rs.15.15 crore to produce 4,600 tonnes per annum of Indian delicacies and 288,000 litres of fruit juices in Sriperumbudur near Madras. Commercial production will commence from October this year.

SAGH, started by K. Damodaraswamy Naidu, has been in the catering field for over two decades. It runs a chain of restaurants in Coimbatore besides a three star hotel.

Imported machinery has been installed with some modifications to meet the specific requirements of Indian foods like *idli*, *vada* and rice preparations. The snacks are battered and breaded, flash fried and frozen without being touched by hand. This process, reduces the oil content, the food is crunchy and can be preserved in the frozen state upto six months.

(Business India August 31 - September 13, 1992, 35-36)

391 Kotharis to set up brewery in Karnataka

The House of Kotharis is going in for beer manufacturing, the long cherished project of the late D.C. Kothari. The plant is being set up in Bidar district of Karnataka.

Mr. P.D. Kothari, who has recently taken over the reigns of the Kothari conglomerate after his father's death, told *The Economic Times* that his group had entered into a technical collaboration with the German giant, Holstein, the project which will initially have a capacity of 50,000 hc liters. At a later stage, the capacity will be expanded to 65,000 hc litres, he said.

(The Economic Times 5 August 1992, 1)

392 Charminar Breweries to set up beer unit

Charminar Breweries Ltd. (CBL) is setting up a beer manufacturing unit at Sivampet in Medak district, 60 km from Hyderabad. CBL's project will have an installed capacity of 75000 bottles of beer per day and will meet the growing beer demand in Andhra Pradesh as well as elsewhere in the country.

Announcing the project to newsmen here on Friday, Mr. K.V.D. Prasad Rao, Managing Director, said CBL has entered into a marketing tie-up with Spencer Co which would buy 70 per cent of beer manufactured. The balance

30 per cent will be marketed by CBL on its own. The unit will produce strong, lager and also draught beers.

(Financial Express 3 August 1992, 11)

PERSONALIA

393 Kulwant Rai new president of Cifti

Mr. Kulwant Rai, an eminent industrialist, has become the President of Council for Indian Food Trade and Industry (Cifti). Mr. Rai shall hold this post for one year.

Cifti is a specialised organisation set up by Federation of Indian Chambers of Commerce and Industry (Ficci), dealing exclusively with food trade industry. Mr. Rai took over as the President of Cifti at the conclusion of fourth annual session of Cifti held here on Tuesday, a release said.

(The Economic Times 29 September 1992, 14)

FEATURE ARTICLE**OVERCOMING THE EDIBLE OIL SHORTAGE IN INDIA****K.T. Achaya**

282, Hundred-feet Road, Indiranagar, Bangalore-560 038

ABSTRACT

From being a huge traditional exporter of oilseed products in the past, insufficient growth of production and ever-increasing demand led to imports after about 1965. This rose to the alarming proportion of half of indigenous production in 1987/88. A good monsoon thereafter, and a series of steps taken by various bodies, have since reduced imports drastically. These efforts are described in terms of oilseeds productivity, agricultural strategies, new oilseed crops and other oil sources, technological improvements, the conceptual initiatives of the co-operative sector, government policies and new nutritional insights that have tempered fat intake.

OIL SHORTAGE

Historically, India was the major world supplier of oleaginous materials. The average annual export figures in the period 1929-34, for example, were 10 lakh tonnes of oilseeds, 20 lakh tonnes of oils and 3 lakh tonnes of oilcakes, with enough left over to meet Indian needs. Till about 1965, demand in the country was able to meet supply, but thereafter the picture changed.

Three factors influence the demand for oil, and they are cumulative. These are the annual

growth of population, the *per capita* income increase, and the so-called elasticity of purchase of oil as income increases, which is close to unity (for cereals, in contrast, it is only 0.4). These factors have totalled about 6 per cent in recent decades, and oil availability has to increase annually by at least the same figure if demand is to be met.

This did not occur, and to meet the *per capita* demand of 15-17 grams a day, imports became necessary. As oilseed production continued to lag, these imports mounted steadily every year, reaching in 1987/88 a record figure of 18.2 lakh tonnes, in which year

oil production was 37.7 lakh tonnes from an oilseed output of 127 lakh tonnes.

A sharp change in the scenario occurred the following year. Oilseed production, spurred by an exceptionally good monsoon, and by other inputs which will be considered later, leaped to over 180 lakh tonnes, a 50 per cent increase over the previous year. Imports came down sharply to just 3.7 lakh tonnes, but rose to 6.1 lakh tonnes the next year as oilseed production dropped to 167 lakh tonnes after a bad monsoon. Thereafter, oilseed production has exceeded 190 lakh tonnes in two successive years, and imports of oil have only been nominal. In fact thanks to excellent oilcake exports, the oleaginous sector is credited with net imports of Rs. 1000 crores in 1991/92.

Though disastrous shortfalls in future seem unlikely, there is little room for complacency. Projections even at the existing rate of consumption show that about 250 lakh tonnes of oilseeds, or about 80 lakh tonnes of oil, will need to be produced at the turn of the century, especially if income elasticity for fat purchase is not depressed by excessively high oil prices.

MEETING FAT DEMANDS

What have been the factors that have turned the tide, and what does the future seem to hold? We may consider these developments under several heads.

Oilseed productivity

Indian productivity is very low in respect of every oilseed. Thus for the groundnut, which has long been India's dominant oilseed, average yields have hovered around 760 kg/ha, against a world average of 1122 and a figure of 3175 in the country of highest productivity, namely the USA. For rape-mustard, Indian productivity is 694, the world average 1262 and the world's

highest 3058 (in the Netherlands). For the sunflower the figures are: India 434, world average 1308 and world's highest 2378 (in France). Soybean productivities stand thus: India 754, world 1925 and world's best 3063 (in Italy). A major reason for these low yields in India is that oilseeds are mainly rainfed crops that receive low priority in the competition for irrigation water. In a good monsoon year even, yields increase quite sharply.

Indeed, as irrigation gradually expands, oilseed productivity has distinctly risen. In 1980/81, only 14.3 per cent of all oilseed crops were irrigated, but by 1988/89 the figure had risen to slightly over 20 per cent. Yield of various oilseeds in these two years stood as follows in kg/ha: groundnut 736 and 1132, rape-mustard 560 and 906, sesame 180 and 274, safflower 465 and 549, and soybean 728 and 892, for seven major oilseeds taken together, the yields in these two years were 587 and 864 kg/ha, an improvement of nearly 50 per cent. Such increasing productivity is an important positive sign.

Area under oilseeds has also risen, from 195 lakh hectares in 1985/86 to 250 lakh hectares in 1991/92. Scope for area expansion in future is restricted.

Agricultural strategies

Groundnut: Though India's major source of oil for the last fifty years, the limitations of the groundnut are becoming apparent. The seed sowing rate is as high as ten per cent of the crop, and it is shallow-rooted and therefore highly sensitive to water availability. A major drawback is the vulnerability of the groundnut, both underground in the field and after harvesting and storage, to invasion by the *Aspergillus* family of moulds which elaborate powerful liver toxins. Despite its great value to the farmer as a source of animal fodder which remains succulent even after the nuts have

been harvested, and its intrinsic ability as a legume to enrich the soil with nitrogen, it does seem that groundnut production in India has perhaps already touched its peak at about 80 lakh tonnes annually. A marked shift has occurred; from having been an entirely kharif or rainy-season crop, equal quantities now derive from both kharif and rabi seasons, with considerable amounts being raised in non-traditional areas where the groundnut has never been grown before.

Rape-mustard: Barely a decade ago, this oilseed, though holding second place, contributed just 15 per cent of all the oil, against 60 per cent from groundnut oil. This year it is expected that rape-mustard oil will top the list, seed production having tripled in a decade to around 70 lakh tonnes this year. The newly-bred varieties are high-yielding, hardy, and of short duration, making them excellent choices in rotation systems all round the year. Mustard oil is not inherently pungent; to meet the need of non-traditional users, bland raw and refined mustard oils are being produced by suitable processing. This also yields as residue a saleable meal of high protein content and quality that has good export demand.

Sunflower: Till just two years ago, the sunflower had been raised only in Maharashtra, Karnataka and Madhya Pradesh. Even when the rains failed, its long tap root would still ensure a fair crop. Today sunflower cultivation has spread to many more northerly states: against a production of 5.5 lakh tonnes in 1980/81, the crop in 1990/91 was placed at 8.9 tonnes, grown again all round the year.

Soybean: A comparatively new entrant, the crop of 4.4 lakh tonnes harvested in 1980/81 has mushroomed to an anticipated 25 lakh tonnes in 1991/92. Some 85 per cent of this is in Madhya Pradesh, and 6 per cent each in Rajasthan and Maharashtra. Other states like Tamil Nadu are entering the picture. The

protein-rich meal has a ready export market, and the oil finds favour in the production of vanaspati.

Oil palm: Considerable development work is in progress in respect of the oil palm. Three Indian states, namely Andhra Pradesh (East Godavari), Karnataka (Shimoga) and Maharashtra (Kankavli) each have 1000-hectare pilot plantation projects under this crop, and the signs are promising. Kerala has 3700 hectares, and the Andaman Islands about 1500 hectares, under the oil palm for over a decade. A 60-year old plantation at Palode in Kerala has now become the source of seedling supply for new Indian plantations, and the seat of a pilot oil production and refining unit set up by the Regional Research Laboratory, Trivandrum for demonstration purposes. Yields of palm oil per hectare can be as high as 6 tonnes, and the plant yields perennially for at least 30 years after the initial gestation period of 5-7 years. The private sector is eager to come forward with the huge investments necessary to raise large plantations, despite the long wait for returns. Water management will be an important component of the success of oilpalm ventures, and no impact can be expected for at least another two decades.

New oil sources

Certain oleaginous materials that existed in the country but were not tapped have now begun to yield oils for the national pool. These contributions in 1989/90 consisted of oil from the cottonseed (3.4 lakh tonnes), from rice bran (3.5 lakh tonnes), from expeller oilcakes (2.3 lakh tonnes) and from various tree and forest oilseeds (about 25,000 tonnes, of which about 80 per cent consists of sal, neem, mahua and mangokernel fats). Thus about 10 lakh tonnes of "new" oils have been garnered to swell the kitty. More can be had. The untapped potential from the cottonseed has been estimated to be another 25 per cent, from

ricebran 40 per cent, from oilcakes 50 per cent, and from tree and forest seeds as much as 90 per cent, so there is room for considerable optimism. Steps to be taken in respect of the latter include organised seed collection, more remunerative seed prices, better seed storage systems to maintain oil quality, and sound marketing structures.

Technological possibilities

For historical reasons, oil production in India is fragmented between three systems. One is the ancient ghani system, which for centuries produced all India's oil but now yields barely 5 per cent of the total. The expeller system contributes the bulk of about 80 per cent of all the oil, and the solvent extraction system the remaining 15 per cent, with a steady rise in this proportion every year. Daily capacities of units in each system are low, being 35 kg for ghanis, 5 tonnes for expellers and 110 tonnes for solvent plants, while capacity utilisation is from 35-50 per cent since raw material is short. An unfortunate consequence of fragmentation is that 4-5 lakh tonnes of expeller oilcakes, carrying some 30,000 tonnes of residual oil, remain unextracted with solvents because of the high cost of transporting them from their points of origin to solvent plants. A small positive consequence is that solvent plants mop up and extract any oil-containing materials locally available, like by-products of processing industries (palm kernels, maize germ, tobacco seed) or small lots of unusual oilseeds (thumba, karanja, ambadi, palasa, kusum).

New large installations combine expelling serially with solvent extraction, and also tend to be larger in size than in the past. New installations for processing cottonseed, rape-mustard and sunflower seed are all well integrated. The many recent soybean processing units are of average capacity 180 tonnes/day. A quantum leap forward marks

the recent installations of the National Dairy Development Board (NDDB), whose processing units run to 500 tonnes/day and are of the highest sophistication. For the first time ever, NDDB is setting up seed storage and oil storage units of large size and on the best scientific principles.

The co-operative sector

The NDDB arose from dairy co-operatives. In 1979 it set up the Vegetable Oil and Oilseeds Project which now covers about 8 lakhs of farmers in ten states in India. Oilseeds produced by these farmers, augmented with oilseeds procured from the market, are processed using the best of technology in modern refineries, storage and packaging systems. The NDDB has also been entrusted by government with a market intervention operation. This has the twin objects of ensuring price stability both to growers of oilseeds, as being the best incentive to greater production, and to everyday consumers by building up a substantial buffer stock of oil to stabilise oil prices against seasonal and speculative price variations. At the start a price band with lower and upper limits was instituted, but was no more found necessary once prices fell. The Dhara brand of oil includes many products, both single oils and blends, vended in sachets and packs. Lok Dhara, soon to be launched, will consist of a low-priced blend of palmolein and groundnut oil. Dhara sales of 1.13 lakh tonnes in 1991/92 have already made it the largest-selling branded oil in the country.

Policy measures

The NDDB works closely with the Technology Mission on Oilseeds of the government, which has played an important part, using funds specially made available to it, in demonstrations of new oilseeds and varieties

to farmers, in timely assistance to them for buying seeds, fertilisers and plant protection equipment, and in identifying areas where such assistance would be most productive. Another government measure was to vend imported oils (which are always cheaper), after packing in sachets, to consumers on ration cards through the public distribution system. Initially oil blending was restricted to 20 per cent of a conventional oil with 80 per cent of an unconventional oil, but five types of blends in a variety of combinations are soon to be permitted, with adequate safeguards to prevent misuse. The supply of cheap imported oils to manufacturers of vanaspati was discontinued in December 1988; alongside many restrictions on the use of solvent-extracted oils in vanaspati were also abolished, and some incentives were offered to encourage the use of certain newer oils like the ricebran in the hydrogenation industry.

Nutritional considerations

Unexpected light on oil needs has come from the angle of nutrition. Thanks to the small quantities of fat (3-5 per cent) present in cereals (which constitute the bulk of Indian diets all over the country), and in other food components, common diets everywhere carry an average of about 25 grams of fat daily. In no segment of the Indian population, even the

poorest, is fat intake now considered nutritionally critical. On the other hand, affluent Indian urban groups, apart from getting about 40 grams of invisible fat a day from their superior diets, also use 50 grams or more of cooking fat; even one-third of the total daily calories can be derived from fat, constituting a well-recognised health hazard. Reducing oil intake to say 20 grams a day would greatly benefit the health of these groups. Since 40 per cent of all the fat in India is consumed by the upper 5 per cent of the population, lowering their daily use of fat would also result in a considerable reduction in total fat demand. The Technology Mission on Oilseeds has launched a welcome advertisement campaign in leading magazines in the country to bring home these facts. Such specific efforts, coupled with the general diffusion of knowledge, is sure to have its effect in depressing national fat demand in due course.

CONCLUSION

It is certain that the worst is over in regard to the oil shortage. There is justified room for optimism that the many forces now at work will soon bring about a match between consumption and demand for vegetable oil, and that this will be sustained in future.

FEATURE ARTICLE

DESIGN AND DEVELOPMENT OF CONSUMER PACKAGES FOR EDIBLE OILS

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Edible oils constitute a significant component of human diet contributing calories, essential fat-soluble vitamins and fatty acids.

Although a major portion of the required oils is being produced within the country, a sizeable quantity is imported. In the distribution and marketing system, packaging plays a vital role in retarding deteriorative changes and presenting social hazards like pilferage and adulteration.

Varying prices of oils within a region and fluctuating prices in different regions and seasons have necessitated their proper and economical distribution. Accordingly consumer size unit packages have replaced conventional bulk packages and traditional packaging materials.

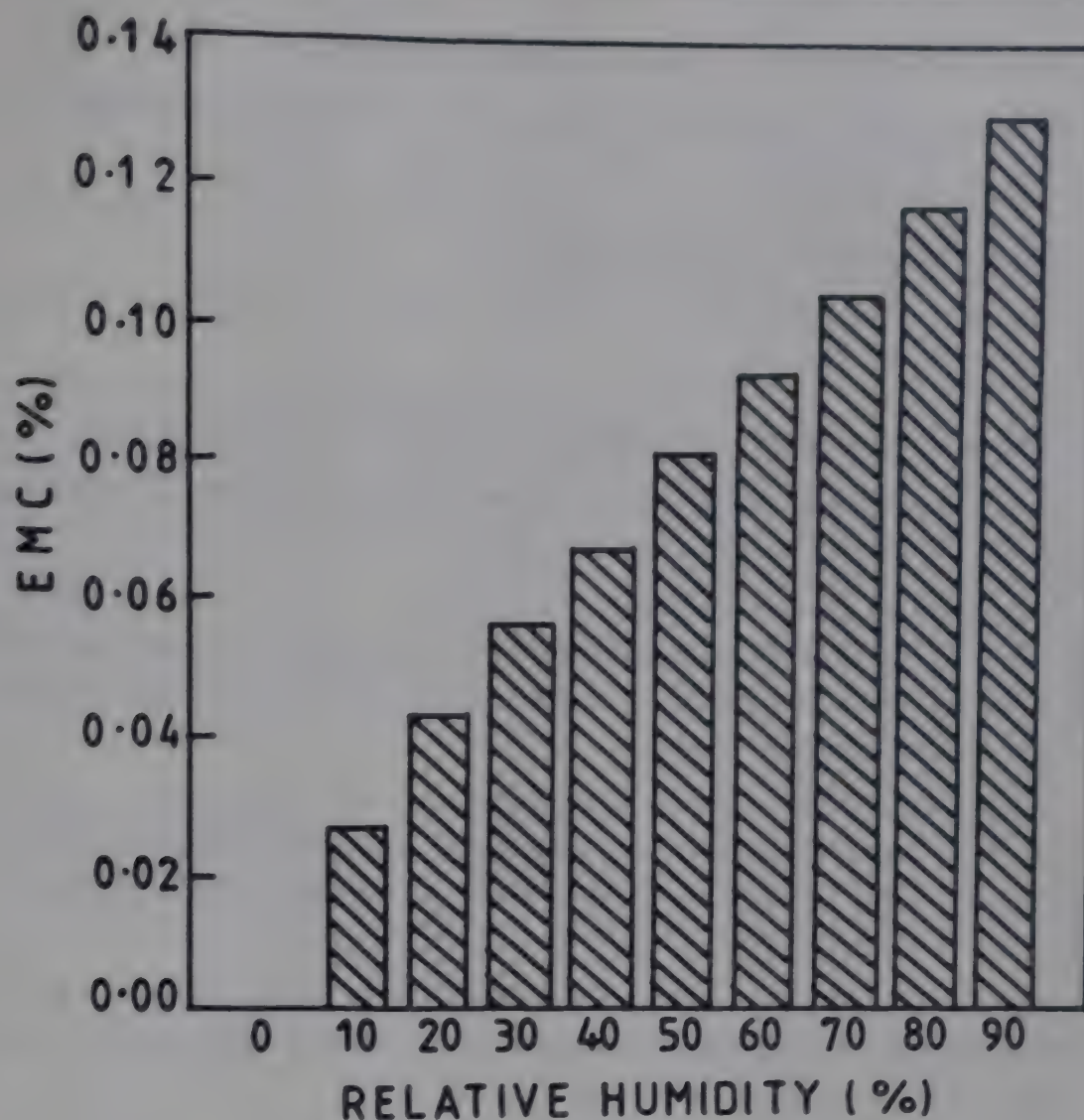
In view of the functional advantages and low cost, several tailor-made packages, both flexible and rigids are being increasingly used to package oils.

PRODUCT CHARACTERISTICS RELEVANT TO PACKAGING:

1) *Reactions with water-vapour*: Edible oils are triglycerides of different fatty acids and generally are in a liquid state at room temperatures. At higher relative humidities, due to more availability of water, hydrolysis of oils takes place yielding free-fatty acids and glycerol due to enzymic activity. Even small quantities of moisture are detrimental leading to hydrolytic rancidity.

The relation between the moisture content and the external relative humidity for RBD palmolein is given in the figure 1. The figure indicates that the equilibrium relative humidity corresponding to 0.10% moisture content at 27°C is 65% and that above this level, rapid deterioration occurs.

2) *Reactions with oxygen*: Oxidation is a major cause of deterioration in oils, especially in those containing unsaturated fatty acids particularly oleate, linoleate and linolenate. The interactions lead to the formation of hydroperoxides which in turn decompose to liberate peroxides and hydroperoxides and then to aldehydes, ketones, acids etc. These are responsible for rancid odour.



The oxidation in oils is accelerated by temperature, relative humidity, uv-radiation, presence of trace metals and degradation products of oxidation.

3) **Physico-chemical properties of oils:** The liquid nature of oils necessitates an absolutely leak-proof package and good impact resistance. The packaging material coming in intact should be inert, should not impart taints and be compatible.

PACKAGING REQUIREMENTS OF OILS:

To prevent or retard chemical deteriorations, for easy handling and transportation and to provide required shelf-life and help in selling, the requirements are:

1. Should have low water-vapour and oxygen permeabilities.
2. Should have good grease-resistance.
3. Should screen out uv-light and deteriorative radiations.
4. Have good heat-seal characteristics.
5. Should not taint the product and prevent cross-tainting.

6. Have impact resistance and compression strength.
7. Should possess rigidity and stiffness to run well on machines.
8. Have good printability and space for display.
9. Should be non-toxic and non-migratory.
10. Should be economical, easily available, easy to use and easily disposable.

Requirements of packages according to standard specifications:

The packaging materials and packages should conform to relevant standards like PFA, Agmark, BIS and packaging and Labelling Act etc.

1. **Storage tests for suitability:** Shelf-life of 40 days and 60 days under 38°C, 90% RH and 27°C, 65% RH respectively. Quality standards specified (BIS) for refined oils are maxima of 0.10% moisture and 0.25% FFA, and the product should be free from rancidity and objectionable off-odours.

2. **Performance tests:** Stack load test specifies 20 N per pouch of 100 g, 30 N for 200 g, 40 N for 500 g and 50 N for 1 kg pouch, load to be withstood for 72 hours. The drop test specifies for 5 pouches one drop on each flat surface and one drop on each longer side from 1.2 m height.

3. **Migration tests for safety of use:** Overall migration value with n-heptane as the food simulating solvent, carried out at 25°C, 30 minutes should not exceed 60 ppm or 0.1 mg/sq.cm. of contact surface.

PACKAGING METHODS AND FORMS:

- | | |
|-------------------------|--|
| 1. Traditional packages | Metal containers, especially tinplate, plastics and glass. |
| 2. Newer packages | Flexible pouches, bag-in-box, semi-rigid containers, and Rigid containers. |

Flexible pouches:

Both flat (pillow and 4-sides sealed) and stand-up style pouches are being used for the following reasons:

- Optimum balance between costs and benefits.
- Reduces storage space, both empty and filled packs.
- Offers protection from contamination.
- Pigmented films are barriers and attractive.
- Optimum barriers to water vapour, oxygen and volatiles.
- Can work well on automatic form-fill-machines and as a pre-formed pouch with sealing equipment.

Some of the composite flexible packaging materials used to pack oils are:

- * Laminates: Polyester/LDPE, Metallized PET/PE, Polyamide Ionomer, PET/HD-LDPE, PET/LD/Ionomer, PET/FOIL/HD etc.
- * Co-extrusions: LDPE/HDPE, LDPE/HDPE/LDPE, HDPE/LDPE/ EAA, PA/LDPE/HDPE, PA/IONOMER.LLDPE or PP or HDPE/BA/PA/BA/EAA etc.

Lined folding cartons and paper-board cartons:

Lined folding carton (LFC) use is a system in which a flexible package in the form of a pouch is glued to an outer paper-board carton. The inner liner bag is generally made of paper/PE, PET/PE, Met.PET/PE, paper/foil/PE, Paper/Met.PET/PE combinations.

Paper-board cartons of brick shape (Tetrapak) consist of PE/Paper-board/PE/Foil/LLDPE + Ionomer.

Rigid unit containers:

Blow moulded pigmented containers of HDPE which have good water-vapour and light barrier properties have been used for a few years and currently for 5 kg capacity.

Stretch blown moulded bottles of PET, PVC and PP are being used for 1 or 2 kg consumer packages. They are light in weight, possess good impact resistance, clarity, balanced odour and gas barrier properties.

The barrier properties to water-vapour and oxygen transmission rates are given in the Table 1.

PACKAGING AND STORAGE STUDIES:

The choice and selection of any of the above materials is dictated by factors such as nature of oil, environmental and distribution conditions, expected storage life, properties of packaging materials, cost and availability etc. Detailed storage studies in consumer packs made of different flexible and rigid containers have been carried out at the (i) 38°C and 90% RH (Accelerated) and (ii) 27°C and 65% RH (BIS or normal) conditions. The results of the studies on groundnut oil and mustard oil are shown in table 2.

The initial moisture contents of refined oils was found to range between 0.04 to 0.06%. The maximum permitted limit is 0.10% which is likely to be attained within few days at accelerated condition. Hence, a highly water-vapour barrier material only can afford the desired shelf-life. For high RH condition, a material with WVTR of 1-2 g/sq.m/24 hours is required. However, at 65% RH and below, where the EMC of refined oils is about 0.1%, the change from the initial moisture content of 0.06% is negligible and a moderate WVTR material can be used (2 - 6 g/m² day).

Table 1: Barrier properties of packaging materials

Packaging material	Thickness, micron	WVTR	OTR
Laminates:			
PET/LDPE	12/37	9.5	75
PA/IONOMER	25/50	7.2	85
MET.PET/LDPE	12/37	1.5	4
PET/HD-LDPE	12/112	3.3	75
MET.PET/HD-LDPE	12/112	0.6	2
PET/LDPE/IONOMER	12/25/25	6.4	70
HDPE/IONOMER	25/25	3.8	1395
PAPER/FOIL/LDPE	40/9/37	0.0	0
PET/FOIL/CPP	12/9/60	0.0	0
Co-Extruded Films:			
LDPE/HDPE	120	2.0	670
HDPE/LDPE/EAA	110	2.1	766
LDPE/BA/PA/BA/EAA	90	5.4	46
LDPE/BA/PA/EAA	125	3.0	45
CPP/BA/PA/BA/EAA	90	4.1	45
Monofilms:			
LDPE	25	16	7750
LLDPE	25	10	7500
HDPE	25	6	1800
CPP	25	8	1800
PA (NYLON-6)	25	280	40
EAA	25	27	4560
PET	25	21	55
EVAL	25	215	1-20

WVTR: Water-vapour transmission rate, $\text{g/m}^2 \cdot 24 \text{ h}$ at $38^\circ\text{C}/90\% \text{ RH}$.

OTR: Oxygen transmission rate, $\text{ml/m}^2 \cdot 24 \text{ hours}$ atmosphere at 27°C .

To provide adequate protection against rancidity, good oxygen barrier combinations based on PA or PET are to be used.

Unless proper sealing conditions are employed, sealing failures resulting in leakages are considerable. Further, oil contamination in the seal area also was found to reduce the heat-seal strength and cause failure. However, inner contact layer based on EAA (Primacor), or Ionomer (Surlyn) have minimized to some extent this problem.

Table 2: Storage characteristics of edible oils

Oil packed	Packaging material	Shelf life in days	
		38°C, 90% RH,	27°C, 65% RH
1. Refined ground-nut oil, 500 g.	HDPE (125 µm)	20	40
	HM HDPE (50 µm)	20	40
	HDPE-LDPE coextruded (125 µm)	40	100
	PET/LDPE (12/75 µm)	60	120
	PA/Ionomer (25/37 µm)	60	120
	Paper/LDPE/Foil/LDPE (60 gsm/100 µm (9 µm/100 µm)	80	150
	Met PET/LDPE (12/75 µm)	60	140
	HDPE bottle	80	120
2. Refined groundnut oil, 200 g 2 litre "	PET/LD-Ionomer (12/60 µm)	20	100
	PA/Ionomer (50/37 µm)	20	180
	HD/Ionomer (50/50 µm)	20	90
	PVC bottle	40	150
	PVC-stretch blown	-	150
3. Refined Cotton-seed oil 1 litre.	PET/LD-HD coextruded (12/120 µm)	60	180
4. Raw mustard oil, 200 ml.	PA/Ionomer (25/50 µm)	60	120
	PET/HD-LDPE (12/112 µm)	120	+ 120
	Met. PET/HD-LDPE (12/112 µm)	+ 120	+ 120

The yields and costs of flexible packaging materials and also the costs of rigid consumer unit packages are given in the Table 3.

Table 3: Yields and costs of unit packaging materials.

Packaging material	Thickness, micron.	Yield m ² /kg	Approx. cost, Rs/kg.
1. Flexibles:			
HDPE	25	41.2	60
HM-HDPE	25	40.5	70
CPP	25	44.0	70
LDPE/HDPE	25/25	21.0	70
LD/HD/LD/LD/LD	95	11.3	90
LD/BA/PA/BA/LD	95	10.7	170
LD/BA/PA/BA/EAA	95	10.7	200
PET/LDPE	12/37	19.6	200
MET.PET/LDPE	12/37	19.6	225
MET.PET/HD-LDPE	12/100	9.5	200
PAPER/FOIL/PE	40/9/37	10.2	180
PET/FOIL/PE	12/9/37	13.3	260
2. Rigid:			
HDPE	0.5 mm	1 litre	3.00 each
PP	"	-	5.00 each
PVC	"	-	3.00 each
PET	"	-	10.00 each
3. Stretch blown:			
PET	"	-	-
PVC	"	-	-
PP	"	-	-

Abbreviations used in the text denote:

LDPE	Low-density polyethylene,
HDPE	High-density polyethylene,
HM-HDPE	High molecular by weight HDPE.
LLDPE	Linear LDPE
CPP	Cast polypropylene
BOPP	Bi-axially oriented
PP PA	Polyamide (Nylon-6)
PET	Polyethylene terephthalate
MET.PET	Metallized PET
EAA	Ethylene-acrylic acid
PVC	Polyvinyl chloride
BA	Bonding agent.

